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THE UNIVERSITY OF HONG KONG

AN EMPIRICAL STUDY OF THE DETERMINANTS OF SERVICED APARTMENT RENT IN HONG KONG

A DISSERTATION SUBMITTED TO THE FACULTY OF ARCHITECTURE IN CANDIDACY FOR THE DEGREE OF BACHELOR OF SCIENCE IN SURVEYING

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION

BY

POON KA PO

HONG KONG

APRIL 2005

Declaration

I declare that this dissertation represents my own work, expect where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

Signed: _____

Name: _____

Date: _____

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ABSTRACT

One of the under-researched sectors in real estate studies is the serviced apartment market. While both conventional apartments and serviced apartments satisfy accommodation needs, there are significant differences between the two that affect their marketability and their value.

The overall aim of this dissertation is to present an analysis of the serviced apartment sector in Hong Kong. As pointed out by DiPasquale and Wheaton (1996), "*when households evaluate a housing unit they apply a valuation process that is based on the unit's various individual attributes*." Since these explicit prices for individual attributes can never be directly observed in the housing market, it is important for both sellers of existing units and builders of new units to understand this implicit valuation process of buyers. Regarding this, this dissertation provides a starting point for formulating a model to quantify the relationship between rent and different physical and locational attributes, range of amenities and services provided in serviced apartments in Hong Kong. It is hoped that the study will provide serviced apartment operators insight into how to allocate their limited resources to maximize rentals. This can not only assist serviced apartment operators in rent setting but also feasibility analysts on the design of serviced apartment projects.

This study begins with considering the factors influencing the potential supply and demand of serviced apartment units in Hong Kong and characteristics of these serviced units. In addition, challenges and opportunities that may emerge in Hong Kong serviced apartment sector over the coming years are also discussed. A hedonic price model is then derived which is generally applicable to the serviced apartment sector. The effects of physical and locational attributes, range of amenities and services provided and occupancy restrictions on serviced apartment rent are empirically evaluated based on transactions took place between April 2002 and November 2004. The results show that physical and locational attributes, such as age, size, floor level, number of bedrooms, proximity to public transport, etc. which have been proved to affect conventional apartment value are also confirmed to affect serviced apartment rent. In addition, the amenities and services offered in serviced apartments, as well as including utilities charges in the rental package do increase serviced apartment rent to a large extent. The study concludes with a summary of the findings, together with the limitations encountered and suggestions for further research that may be carried out in the Hong Kong serviced apartment sector in the future.

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Chapter 1: Introduction

1.1 Background

One of the under-researched sectors in real estate is the serviced apartment sector. While empirical studies on the local real estate market are mainly devoted to the conventional residential apartments, there are few published academic studies concerning the serviced apartment market. This lack of prior studies is particularly true in the context of Hong Kong. It can be explained by the small size of the sector, and the fact that this market has very keen competition. Even the market insiders find it difficult to acquire the transaction information of serviced apartments of their competitors, not to mention the market analysts and the academic researchers.

Despite the lack of prior studies, research into this market is essential to both the academic and practical business world. Academically, researchers studying the serviced apartment market can find out whether certain economic theories hold in this sector, and to what extent these theories hold, compared with other kinds of property classes. Practically, studying the market is beneficial to serviced apartment operators, tenants and interested developers. Market research provides market estimates of the perceived values of different housing attributes which can assist potential serviced apartment operators and feasibility analysts in adjusting their designs. This is also important to existing serviced apartments since their operators invest large amount of money in renovation and maintenance works every year. What is more, studying this market can assist developers in rent setting, according to the bundle of attributes their serviced apartment projects possess. Tenants can also evaluate the rental charges and housing attributes of their serviced flats against the market trend by using the research findings. All in all it is of vital importance for the operators and tenants to know those factors that significantly affect serviced apartment rent.

The overall aim of this dissertation is to present an analysis of the serviced apartment sector in Hong Kong. As pointed out by DiPasquale and Wheaton (1996), "*when households evaluate a housing unit they apply a valuation process that is based on the unit's various individual attributes*." Since these explicit prices for individual attributes can never be directly observed in the housing market, it is important for both sellers of existing units and builders of new units to understand this implicit valuation process of buyers. Regarding this, this dissertation provides a starting point for formulating a model to quantify the relationship between rent and different physical and locational attributes, range of amenities and services provided in serviced apartments in Hong Kong. It is hoped that the study will provide

serviced apartment operators insight into how to allocate their limited resources to maximize rentals. This can not only assist serviced apartment operators in rent setting but also feasibility analysts on the design of serviced apartment projects.

1.2. Objectives

The objectives of this dissertation are as follows:

- To review the serviced apartment industry in Hong Kong; and
- To examine to what extent serviced apartment rent is affected by locational and physical attributes, and more importantly, by their range of amenities and services provided.

1.3. Methodology

The study is divided into two parts. The first part presents a background analysis, where the existing demand and supply of serviced apartments, factors affecting the supply pipeline and characteristics of these apartment units are discussed and analyzed. Journals, books and newspaper will be studied; a number of interviews with developers and market analysts will also be conducted.

The second part of the study identifies major determinants of serviced apartment rent in Hong Kong, with reference to previous literature concerning the rent determinants of ordinary residential units. A regression analysis is conducted to examine the identified determinants. The regression results are presented and analyzed.

1.4. Scope

To investigate the serviced apartment market, it is essential to have a clear definition of serviced apartments first. Nevertheless, there has no standard definition of a serviced apartment; even the government has encountered difficulties in defining serviced apartments in enforceable legal terms (Town Planning Board, 2000).

Generally, a serviced apartment is considered as fully furnished, short term, self contained accommodation, and to provide additional services; usually a small kitchen is included. However, during the stage of information gathering, the author found that a stricter definition is required to avoid any misunderstanding. According to CB Richard Ellis Hong

Kong, a serviced apartment refers to residential accommodation that satisfies the following criteria[1]:

"1. The interior is fully furnished and must have a bathroom and a formal pantry area fitted with a refrigerator and a stove or hob unit, and with linen, crockery and kitchenware, thus allowing tenants to prepare their own meals.

2. It must provide the occupant with the option of housekeeping or maid services, which include change of towels and linens and general cleaning. These services can be provided either on a daily basis or a few times a week. Services are often included as part of the rental package; however, they may also be provided as an optional 'extra'. All housekeeping or maid services within the same Serviced Apartment building are managed by one central management office."

This definition of serviced apartments will be adopted throughout the dissertation.

1.5. Organization

There are a total of five chapters in this dissertation. Chapter 2 is the literature review, which examines previous literature about the hedonic price model and determinants of conventional residential apartment rent. This chapter provides inspiration for how the model to be constructed in this study.

Chapter 3 contains an analysis of the supply and demand dynamics of serviced apartments, and a snapshot of their characteristics in Hong Kong. This chapter is to give readers a general picture of the serviced apartment market in Hong Kong.

Chapter 4 explains in detail the methodology used in this dissertation, and the variables and data used in the hedonic price model. This chapter provides insight into how to resolve different data problems, including the time effect, and the presence of high correlations among different variables. In addition, the definition of the variables, the reasons for inclusion of the variables and their expected sign in the regression analysis are explained. This chapter also describes the data used in the empirical analysis, including the sources of data, period of observation, and selection of properties.

[1] CB Richard Ellis Hong Kong (2004), *Hong Kong Serviced Apartment Market Update*. Hong Kong: CB Richard Ellis Global Research.

Chapter 5 presents the model and the empirical results. Interpretations of the results are delivered in this chapter. Finally, chapter 6 is the conclusion. It revisits the findings of this dissertation, discusses the limitations of the empirical tests as well as suggestion for further studies.

Chapter 2: Literature Review

One objective of this dissertation is to empirically examine the determinants of serviced apartment rent. A hedonic price model will be employed to establish the influence of the relevant determinants. Previous research on this model and literature related to determinants of residential apartment value are thus needed to be reviewed to facilitate the construction of the model later on. Consequently, this chapter examines previous literature concerning the hedonic price model, and the academic theories and empirical findings explaining the determinants of conventional residential apartment value. This chapter tells the rationale behind the hedonic model and provides inspiration for how the model of serviced apartments to be constructed in this study.

Economists assume that each household is consistently attempting to maximize its utility for the enjoyment of any commodity within the limitations of its available resources. Since housing attributes inherent in a dwelling can also be treated as economic commodities, their quantities can also be adjusted to increase a household's utility. Concerning this, a hedonic price model can be employed to see how households, serviced apartment tenants in this case, value different housing attributes of their serviced suites. It is assumed that the greater the implicit price of a particular housing attribute, the greater the extent serviced apartment tenants value this particular attribute since it increases the utility of households in general.

2.1. Hedonic Price Model

The hedonic price model was derived from Rosen's (1974) implicit market concept which suggests that a consumer's utility for a good or service is based on attributes it possesses. In certain circumstances it may be possible to separate the effects of the various attributes of a good in a way which demonstrates how changes in the levels of each attribute affect the individual's utility. In hedonic pricing this is achieved by modeling individual's willingness to pay to consume a particular good as a function of the levels of the good's attributes.

The hedonic price model has been adopted in substantial real estate studies to examine the impact of various housing attributes on apartment values. In this case, each property may be assumed to constitute a distinct combination of attributes which determine the price which a potential purchaser or tenant is willing to pay. Nevertheless, as pointed out by Chin and Chau (2003), most of these studies were done in America and Europe (Shenkell,

1975; Follain and Malpezzi, 1981; Walden, 1990; Benjamin et al., 2000; etc.). Only a few were conducted in Asia, such as in Hong Kong (Chau, Ma, & Ho, 2001; Mok, Chan & Cho, 1995; So, Tse, & Ganesan, 1996), Mainland China (Yang, 2001), Japan (Edmonds, 1984) and Malaysia (Chin and Chau, 2003).

The model considers the market price paid for a unit to be a function of the levels of all observable characteristics of that unit. Hedonic prices are defined as the implicit prices of these characteristics and are revealed from observed prices of differentiated products and the specific amounts associated with them. The model is basically a description of competitive equilibrium condition on a plane of various dimensions where both buyers and sellers locate. All buyers perceive the amounts of attributes embodied in the housing product to be identical, but their subjective valuations of each component attribute may differ. The housing prices together with information about the buyers and sellers of housing can then be used to identify the demand equation for the housing attributes. The magnitudes of implicit prices estimated are thus empirical ones based on sample observations in the market equilibrium situation. Therefore it can be used to identify the underlying parameters of interest that are the determinants of serviced apartment rent.

As mentioned, any property price is the summation of implicit prices of all observable characteristics. Questions arise then as to whether every single housing characteristic should be included in the hedonic price model. Bulter (1982) suggests that only those housing characteristics which are both costly to produce and yielding utility to residents should be included.

2.2. Indifference Preference Theory

As mentioned before, each household is consistently attempting to maximize its utility within the limitations of its available resources. The indifference preference theory helps explain how households, serviced apartment tenants in this case, make decisions, i.e. how they choose their preferred bundles of attributes within their budget constraint.

Within the budget constraint, the allocation of expenditure between commodities by the household depends on its tastes. To study the household choice problem, two goods are always used so that the analysis can be shown geometrically. Figure 1 shows the equilibrium of a household. The budget line AB tells what choices (i.e. the combination of goods) the household can make within budget constraint, whereas indifference curves I_1 to I_5 tell what

choices that household would like to make. A set of indifference curve is called an indifference map.

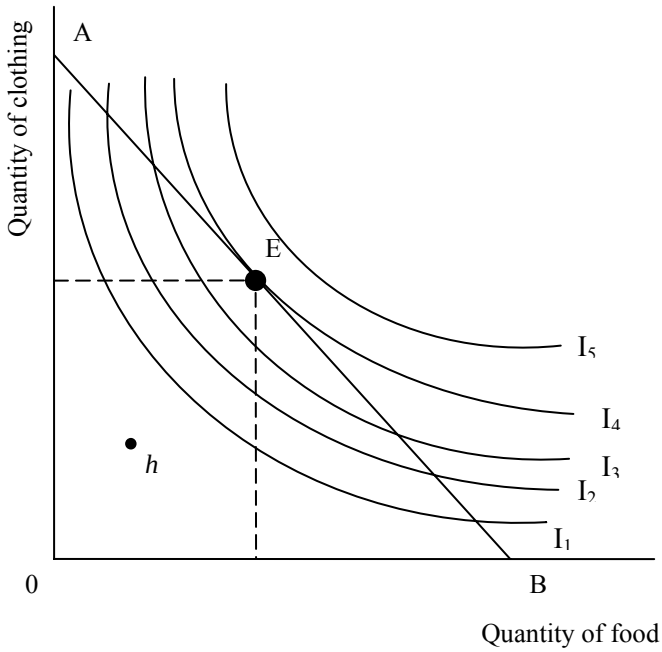

Figure 1: The Equilibrium of a Household

Source: Lipsey (1989), p.132

About the budget line. In Figure 1, it is assumed that the household allocates all of its income between two goods: food and clothing. Line AB in Figure 1 illustrates all the possible bundles available to the household. Points on the line between the two end points A and B indicate that the household is buying positive amount of both commodities. While these two points indicate the entire household's income spent buying either food or clothing only.

An indifference curve is plotted by identifying different combinations of commodities which yield the equal satisfaction to the household. The household is indifferent among the combinations indicated by any points on one indifference curve. Since economists assume that the household always prefers more of any commodity to less of that commodity, any point above the curve say, I_1, will be obviously superior to some points on the curve in the sense that it will contain both more food and more clothing than those points on the curve. But since all points on the curve are equal in the household's eyes, the point above the curve must therefore be superior to all points on the curve. Accordingly, points such as *h*, which is below and to the left of the curve, represent bundles of goods that are inferior to all bundles represented by points on the curve.

It is also worth noting that the less of one commodity that is being consumed by a household, the less willing will the household be to give up a unit of that commodity to obtain an additional unit of a second commodity. This is known as the diminishing marginal rate of substitution. For instance, along the indifference curve I_1 in Figure 1, the household is consuming bundles with less and less clothing and more and more food. According to the hypothesis of diminishing marginal rate of substitution, the rate at which the household is willing to give up further clothing to get more food diminishes, which is shown by the convex shape of the indifference curve – moving down the curve to the right, its slope gets flatter and flatter.

Finally, the further away any indifference curve is from the origin, the higher is the level of satisfaction given by the consumption bundles that it indicates. As a result, the household seeks to maximize its satisfactions by reaching the highest possible indifference curve, i.e. at a point of tangency between the indifference curve and the budget line. This is point E in Figure 1. It is impossible to reach a higher indifference curve by varying the bundle consumed. At this point the household is in equilibrium.

2.3. Apartment Rent Determinants

While there is a lack of literature concerning the analysis of serviced apartment rent, there is an extensive literature on hedonic price studies related to conventional apartment values. Some of these studies have examined the conventional rental apartments (Marks, 1984; Jud and Winkler, 1991; Benjamin et al., 1997; Frew and Wilson, 2002; Hardin III and Cheng, 2003 etc.) and their findings are relevant to this research[2].

There is a common assumption that households maximize their utility by locating in as near to necessary and desired activities (such as work, shopping, and recreation) as possible. However, the utility maximization is also dependent upon far more attributes apart from locational ones. Going through the previous literature, a wide range of housing attributes have been identified and their contributions to values of apartments have been studied. These housing attributes can mainly be generalized as three traits:

[2] The initial works concerning the rent determinants of conventional residential apartments were possibly by Marks (1984) and Guntermann and Norrbin (1987).

1. Structural traits (S)
2. Locational traits (L)
3. Neighbourhood traits (N)

Structural traits usually refer to physical characteristics related to the property itself, locational traits are the housing characteristics related to the location, and neighbourhood traits concern the quality of the neighborhood environment.

As already mentioned, this dissertation will examine the rent determinants of serviced apartments. This sector is different from the residential sector that serviced apartment operators attach much more importance to their provision of facilities and services, because their target tenants are typically expatriate executives or the local high-income group, who require a high standard of living. These facilities and services offered are also believed to increase utility of the serviced apartment tenants. As a result, it is useful to discuss the three mentioned traits and generalize different attributes of serviced apartment flats into four components, namely:

1. Physical attributes;
2. Locational attributes;
3. Amenities provided; and
4. Services provided and Occupancy restrictions.

In the following section, previous literature regarding these four set of components will be reviewed.

2.3.1. Physical Attributes

Several physical attributes have been included in the hedonic price model in previous literature. Typical ones are size, number of bedrooms, number of bathrooms, floor level, and presence of a balcony, etc. All of these factors are proved to be significant and have positive effects on apartment rents. This reflects that these physical attributes increase the utility value of conventional apartments so that people are willing to pay to enjoy them. They will thus be included in the model to be constructed in this study. Although the impact of en suite bedrooms, a common characteristic found in serviced apartments in Hong Kong, on apartment rents has not been studied in the literature reviewed, they are believed to have a positive effect on rent since they also increase households' utility.

Apart from the mentioned attributes, Guntermann and Norrbin (1987) study the marginal value of a bedroom for a studio, one or two-bedroom apartment unit.[3] The empirical results verify the significance of an extra bedroom over some size range and indicate that there is a substantial rent increase as a result of the additional bedroom. They also test the relationship between project age, apartment condition[4] and rent. Their results suggested that perceived condition has a more important impact on rent than the project age.

Most of the research uses project age as a proxy to determine the impact of apartment condition on rent and usually find that building age is negatively related to property prices since older apartments incur more costs in maintenance and repair, and also have decreased usefulness due to changes in design, electrical and mechanical systems (Chin and Chau, 2003). However, Li and Brown (1980) find that this is not always true. Increase in age may result in increase in value due to the historical significance or vintage effects of the buildings. As a result, Clapp and Giaccotto (1998) suggest that there are two components regarding the effect of age on housing value: a pure-cross sectional depreciation and obsolescence component, as well as a demand-side component that changes over time.

In Hong Kong, Chau et al. (2001) show that flats with lucky floor numbers are sold at a significantly higher price during property booms than during property slumps. That is because a lucky floor number floor is an intangible attribute that does not bring any benefit for tenants living in that particular unit. It is similar to luxury goods that the demand for which is very volatile and depends on people's wealth.

2.3.2. Locational Attributes

When discussing the impact of locational attributes on housing values, it is necessary to point out the background of land use theories which explain the household choice of residential location. Households seek to maximize the "utility advantage" of a locality over costs of travel. Many previous studies show that utility is influenced strongly by accessibility – the advantages of a particular urban location in terms of movement, convenience and amenity. In the following section, the issues of accessibility will be dealt

[3] They used three variables S1, S2 and S3 to measure the marginal value of a bedroom for a studio, one, or two-bedroom apartment unit respectively, where
S1 = an extra bedroom for a studio between the size of 358-550 square feet;
S2 = an extra bedroom for a one-bedroom unit between the size of 549-815 square feet; and
S3 = an extra bedroom for a two-bedroom unit between the size of 849-1175 square feet.
[4] They used a binary variable as a subjective measure of apartment project quality, for above average appearance and condition and below average appearance and condition.

with first, followed by discussing the bid-rent model from Alonso (1964). Finally, the previous locational attributes included in hedonic price studies will be reviewed.

2.3.2.1. Accessibility

Households seek accessibility to job opportunities, shops, schools and recreational facilities. Harvey (1996) examines the term accessibility under the headings of general accessibility and special accessibility. The former refers to "*the advantage of a particular location in terms of the movement costs (including time) it avoids and the revenue-earning capacity (including convenience) it affords.*" General accessibility depends largely on transport facilities. This is why offices and shops usually prefer to be located in the central business district (CBD) which affords the greatest accessibility. Nevertheless, the CBD is limited spatially. Competition for this location results in high land values. The advantages of accessibility thus have to be compared with the level of rent.

The latter, special accessibility reveals that, within the pattern of urban land use produced by general accessibility, there is a "clustering" of shops and activities[5], both concentratedly and complementarily. Special accessibility is relevant to residential location decisions in twofold. First, concentration of population promotes the provision of libraries, schools and recreational and cultural facilities. Second, since households prefer to live alongside others of the same social and cultural background, religion or race, wedges of high quality housing can be observed in the housing market.

To conclude this section, residential demand for accessibility can be expressed in terms of:

- travel time and costs related to distance from work, shops, schools, entertainment, cultural activities and recreational facilities; and
- non-monetary considerations such as locational prestige, neighbours and family ties, space, fresh air, quiet, etc.

2.3.2.2. Location Preference of Households

Modern studies of urban land uses basically originated from Alonso (1964)[6], who modernized the bid-rent model from von Thünen (1826)[7] to study residential land use in terms

[5] Harvey, J. (1996) *Urban Land Economics*. Basingstock: Macmillan. P.204.
[6] Alonso, W. (1964), *Location and Land Use: Toward a General Theory of Land Rent*. Harvard University Press, Cambridge.

of a monocentric city assumption. He studied the distance from the CBD as the only factor in determining housing prices. The model assumes that there was only one working site and accessibility to this working site was the only concern for consumers when selecting their residential locations. The model predicted that the increase in distance to working site resulted in a decline in site payments as shown in Figure 2 since transportation costs, in terms of both commuting expenses and travel time incurred, would increase with the distance to employment centre.

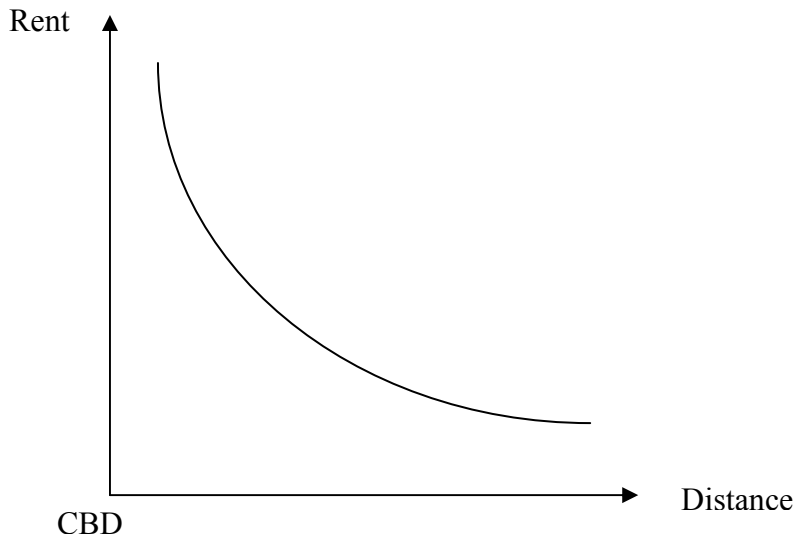

Figure 2: Land Price Curve

Nevertheless, apart from accessibility to work, the non-monetary considerations mentioned above have an additional influence on households as they seek to maximize utility in deciding where to live. Lower rent, accessibility to more house-space and garden and to the countryside attracts households to the suburbs. City centre congestion also increases business and residential movement. These factors increase the complexity of rent gradients. Living near the CBD has the advantage of accessibility, but high rents limit the amount of space which households can afford. Whereas living near the suburbs enables household to obtain space and environmental advantages at a lower rent, transport costs, in the form of fares, time and discomfort, are incurred in traveling to the CBD for work.

As a result, in deciding where to live, there is a trade-off between transport costs to the CBD and the extra space offered by the suburbs, that is, they have to choose between distance from the CBD and the level of rent. This yields bid rent curves showing rents at

[7] Von Thunen was a German Economist who formulated a model of land use and prices in 1826. The model, called the bid-rent model, concentrates on differences in relative transport costs in different types of agricultural production.

various distances from the CBD which provide a household equal satisfaction having regard to the advantages of accessibility versus the rent to be paid as shown in Figure 3. The curve AB joins the points at which a household would become equally satisfied as it moves outwards from the CBD. Similarly, a higher initial rent OC at the CBD would result in a bid rent curve CD further from the origin and depicting a lower level of satisfaction than AB since the household is paying a higher rent to secure a CBD site.

The land price curve depicts market rents at increasing distances from the CBD. Each household seeks to be on the bid rent curve nearest to the origin and thus chooses that location where the land price curve touches the bid rent curve nearest the origin (i.e. H), since this location yields the greatest possible utility at current market rents.

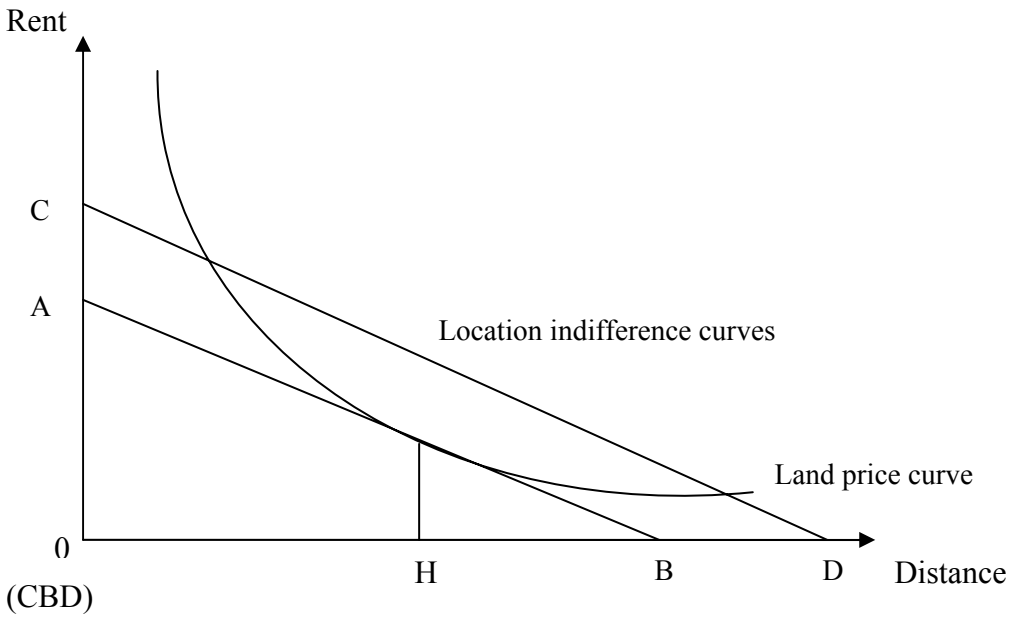

Figure 3: Bid Rent Curves and the Location Decision

Source: Harvey (1996)

According to Alonso's bid rent model, the shape of the bid rent curve, i.e. the location preference of a household, depends upon family tastes and disposable income. The former are largely influenced by the composition of the household. Single people or families consisting mainly of wage-earners who require access to works tend to have a steeper bid-rent curve (i.e. more "location sensitive") compared with families consisting mainly of children. The latter, disposable income of a household, leads to differently-shaped bid-rent curves as well. Low income families cannot afford the transport costs of travelling to the CBD from the periphery. Their bid rent curves thus slope steeply downwards (i.e. more "location sensitive") compared

with the higher-income households who are able to afford transport costs, as shown in Figure 4.

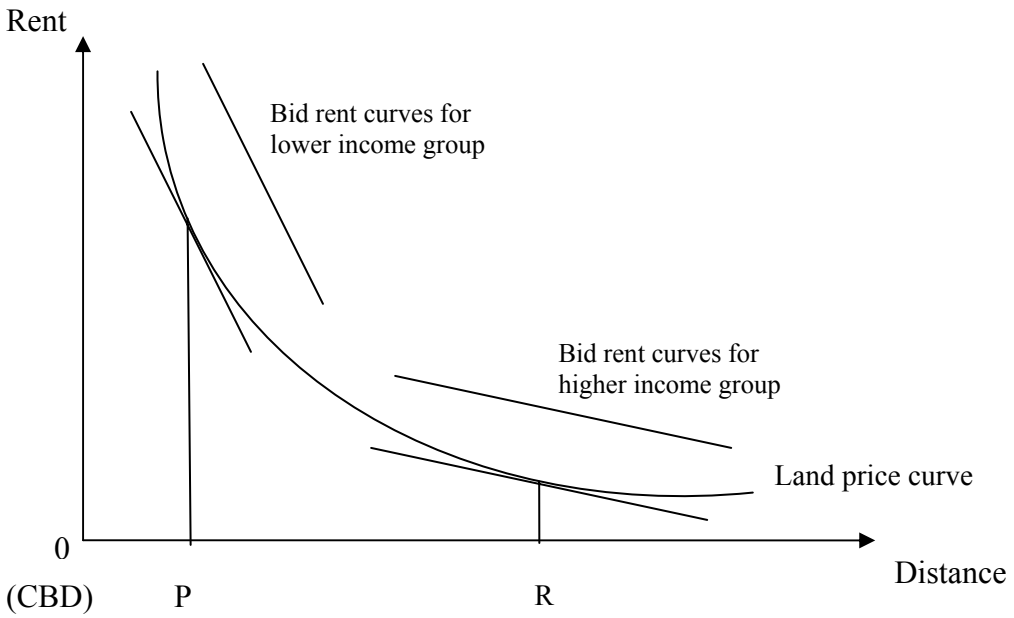

Figure 4: Bid Rent Curves for Different Households

To conclude, according to Alonso, as income increases, accessibility to work, except for the very rich, tends to be an "inferior good" – people prefer to spend more on transport to obtain space and environmental advantages on the periphery of the urban area. As a result, lower-income households are located closer to the CBD, occupying space more expensive per square metre, whereas the high-income households are located further away from the CBD where they enjoy more space at increased transport costs.

2.3.2.3. Locational Attributes in Hedonic Price Studies

One of the important notes made in the last section is when households make their housing decisions, there is a trade-off between accessibility and rent. In fact, accessibility to employment, recreations, schools, etc., and accessibility to public transportation have been included in many hedonic price studies when determining apartment rent. As Chin and Chau (2003) noted, accessibility, in whatever form it has been measured, has some influence on housing prices.

Proximity to a shopping centre implies easy access to facilities and reduced travelling costs, but noise pollution and congestion may also result. In Hong Kong, Tse and Love (2000)

found that accessibility to a shopping centre is not a favourable housing attribute for small/medium units in determining house prices.

Concerning accessibility to transportation, research confirms that the presence of mass transportation system have an impact on income producing properties. Benjamin and Sirmans (1996) find that distance from a metro station has a significant adverse effect on apartment rent in the Washington, D.C. area. Work conducted by Tang (1975) shows that savings in transportation cost tend to have a positive and significant impact on house prices. Sirmans et al. (1989) consider the effect of access to public transportation on rent and produced an interesting result. They show that the closer the proximity to a bus stop, the higher the rents as expected, but the greater is the number of bus routes in a given sector, the lower the rents. They explain this phenomenon is due to the fact that the existence of a larger number of bus routes could be serving as a proxy for income levels and, thus, lower rents would be expected.

In Hong Kong, accessibility is markedly reflected in the rental values in Hong Kong (Hui, 1999). Chau and Ng (1998) examine the effect of improvements in mass transportation system on the price gradient between urban and sub-urban areas. The results suggest that improvement in the public transportation has a negative effect on the price gradient along the railway line. So et al. (1997) evaluates the effects of different modes of transportation to the housing prices. Their analysis indicates that the existence of a bus route is insignificant for middle income households. A possible explanation for this is that the model did not include frequency of transport services available. The MTR and minibuses, which provide more frequent services than buses especially during late evening hours, are positive and highly significant. In Hong Kong, minibuses are widely used for connecting to other transport modes, such as MTR stations and ferry piers.

Regarding the issue of traffic congestion, Sirmans et al. (1989) study the effect of it on rent by measuring whether a unit is located on a major arterial street. They find that the degree of congestion had a significant negative impact on rent.

All of these studies confirm the previous section that there is a trade-off between apartment rent and transport accessibility. To summarize, the impacts of transportation on residential markets can be divided into four aspects (So et al., 1997):

(1) availability of transport;

(2) transportation costs;

(3) travel time; and

(4) convenience of transport.

2.3.3. Amenities Provided

Amenities refer to features or facilities of a place that make life easy or pleasant.[8] As a result, they are also believed to enhance utility of people. Previous literature also studied the contribution of certain common area amenities to market rent. These included covered parking, swimming pools, jogging tracks, tennis and squash courts, saunas, barbecue grills, etc., some of which are also amenities found in some serviced apartments in Hong Kong and thought to have positive impact on rent.

Hardin III and Cheng (2003) show that the availability of a fitness center, social facility and covered parking do significantly increase rent, but the presence of playground facilities have a significantly negative impact. They explain that is because landlords in this market are willing to accept more tenants per unit and attempting to extend marketing efforts away from more traditional tenants. Due to the high correlations among these common area amenities variables, the signs of the coefficients of these variables are sometimes not as expected and/or insignificant in regression analyses. To tackle the multicollinearity problem, Guntermann and Norrbin (1987) adopt 'principal components analysis' to reduce multicollinearity by reducing the number of common area variables.[9] They find that swimming pools vary in importance among different residential apartments. A pool combined with a barbecue does not appear to increase rents, but a pool with hot tub also appeared to increase rents. They explain that is because pools with a hot tub might be more expensive or attractive leading to a higher equilibrium rent. Also, the combination of pools and hot tubs might be associated with newer projects that might have higher rents.

Sirmans et al. (1989) study the provision of swimming pool and covered parking and prove both to have significant positive effect on rent. Regarding other common area amenities, they use a variable which is a simple sum of presence of various facilities, which gives each kind of amenity the same weight in terms of its contribution to rent. These miscellaneous

[8] "amenity n." Oxford Advanced Learner's Dictionary, Ed. Sally Wehmeier. Oxford University Press, 2004.

[9] Guntermann, K. L. and Norrbin, S. (1987), Explaining the Variability of Apartment Rents, *AREUEA Journal*, 15(4), 321-340.

amenities also proved to contribute to rent significantly. Similar approach was then followed by Pagliari Jr and Webb (1996), and Frew and Wilson (2002). While Frew and Wilson successfully show that provision of exercise room and spa increase rent significantly, Pagliari Jr and Webb produce an inclusive result. In Hong Kong, Mok et al. (1995) and Tse and Love (2000) show that the provision of common area facilities in large housing estates tends to increase the prices of such properties, since sports facilities are associated with quality living (Chin and Chau, 2003).

Apart from these common area amenities, previous literature also included some of the unit-specific amenities: the presence of washers/dryers, cable TV, air-conditioning, dishwashers for instance into their hedonic price analyses. However, this type of variables would not be included in this study. This is to follow Bulter's suggestion as mentioned earlier that only those housing characteristics which are both costly to produce and yielding utility to residents should be included. Obviously, both capital and running costs of different unit specific amenities are not very expensive when compared to those common area amenities. As a result, with regards to the model to be constructed in this study, this kind of unit-specific amenities will not be included in the set of amenities variables.

Finally, pleasant views provide a kind of amenity to people. In Hong Kong, Chau et al. (2001) include the presence of sea view in their hedonic price analysis and is showed to affect residential price significantly and positively. Tse and Love (2000) prove cemetery view has a negative impact on property prices in Hong Kong, since in Chinese societies, the view of a cemetery is usually regarded as bad *feng shui*.

2.3.4. Services Provided and Occupancy Restrictions

In the U.S., the provision of maid services when renting a unit is proved to affect rent positively and significantly (Sirmans et al., 1989). All of the serviced apartments in Hong Kong also provide maid services so this factor will be included in the hedonic model study its effect on serviced apartment rent. Apart from maid services, another "must-have" service in serviced apartment is the in-room broadband internet access. The provision of this is also predicted to contribute to rent.

Occupancy restrictions like pets not allowed, requirement of a security deposit have been shown to exert a negative impact on rent (Sirmans et al. (1989), Sirmans et al. (1994), Benjamin et al. (1997), etc.). Jud and Winkler (1991) include lease terms into the empirical analysis of apartment rents although no conclusive results are drawn. Sirmans et al. (1994)

examine the inter-relationship among concessions, rent and occupancy. They generate three regression equations and find that rental concessions have a positive effect on both rent and occupancy rates. Pagliari Jr and Webb (1996) also consider occupancy level when constructing their hedonic price model. They use effective monthly rent as the dependent variable which is defined as the product of effective rental rate and occupancy level. They suggest that owners should be relatively indifferent between a rental rate of $800 per month which generates an occupancy level of 90% as compared to a rate of $900 and an occupancy level of 80%. Comparing the two approaches, Sirmans et al.'s can reflect the effect of different independent variables on rent and occupancy level as separate regression analyses are carried out. Nevertheless, Pagliari Jr and Webb's one should be more reliable due to less noisy data produced from, for instance, multicollinearity amongst independent variables.

In the rental market of conventional residential apartments, utilities charges are usually excluded from rent. However, it should be noted that rent is expressed as a "package" in the serviced apartment market which sometimes includes the utilities charges of occupying a unit. As a result, the rental level should be higher if the charges are included in rent since serviced apartment operators should have already taken into account of the cost and profit required for the inclusion of these charges in the rental package.

2.4. Conclusion

This chapter reviews studies conducted in Hong Kong and overseas and discusses how different housing attributes affect implicit values paid by residents in the ordinary residential market. They provide insight into how the hedonic price model of serviced apartments in Hong Kong may be developed, as discussed in later chapters.

Chapter 3: Hong Kong Serviced Apartment Market

Before identifying the determinants of serviced apartment rent in Hong Kong, it is important to understand the background of the market. For instance, only identifying where the major demand of serviced apartments comes from can the operators exactly find out what kind of inherent characteristics of or services offered are most valued by their tenants. This chapter contains several important issues concerning serviced apartments to give a general picture of the market to readers. The concept of serviced apartments will first be discussed; the supply and demand dynamics of serviced apartments will then be analyzed. Finally, several characteristics of local serviced apartments including their geographic distribution, unit size and mix, services and amenities provided, lease terms offered, and rental charges will be illustrated. This information helps to predict the future development of the serviced apartment market, regarding their supply and demand, as well as their future management and design trends.

3.1. The Serviced Apartment Concept

The definition of serviced apartments has already been defined in Section 1.4. The concept of serviced apartments originated from the US. They are rented accommodations serving as an alternative to hotels for business or leisure travellers. Nowadays many well developed countries have this kind of accommodation. Even in Asia, serviced apartment are common for many well-established cities such as Beijing, Bangkok and Manila.

Serviced apartments were introduced to Hong Kong in early 80s. It was the time the Hong Kong economy prospered. The increase of incoming expatriates, together with the increase of standard of living of local people resulted in this kind of development. The first serviced apartment project was introduced to Hong Kong by the New World Development Company in 1980. It was New World Apartments situated in Tsimshatsui.

Property values in different real estate sectors are determined by the interaction of demand and supply. Thus, supply and demand of serviced apartments in Hong Kong will first be discussed in order to illustrate the background of this market.

3.2. Demand

"The attraction of serviced apartments is that they offer the comfort and facilities of a hotel, with the privacy and facilities of home."

(Foxley, 2002)

Expatriates and tourists are traditionally the two main sources of demand for serviced apartments in Hong Kong. There is also a rising demand from returning Chinese from foreign countries, and local citizens, usually the high-income group.

3.2.1. Expatriates

Hong Kong is a popular venue for hosting regional headquarters or representative offices for multinational companies to manage their businesses in the Asia Pacific, particularly the Chinese mainland. Figure 5 shows the number of foreign companies with regional operations in Hong Kong from 1993 to 2004. Based on a government survey[10], a total of 3,609 overseas companies had regional operations in Hong Kong as at 1 June 2004, representing an increase of 12.5% from last year, and 11% from three years earlier.

Among the responded companies in this government survey, the EU as a whole has the largest total number of regional headquarters and offices in Hong Kong with 1,033 companies, followed by the US (813), Japan (713) and the Chinese mainland (262). Within three years to June 2004, the number of regional headquarters and offices whose parent companies were from the US, EU and Japan increased by 27%, 15% and 3%, respectively. During the same period, the number of regional headquarters and offices representing mainland companies grew by 8%.

[10] Hong Kong Trade Development Council (2005), *Economic & Trade Information on Hong Kong*, http://www.tdctrade.com/main/economic.htm.

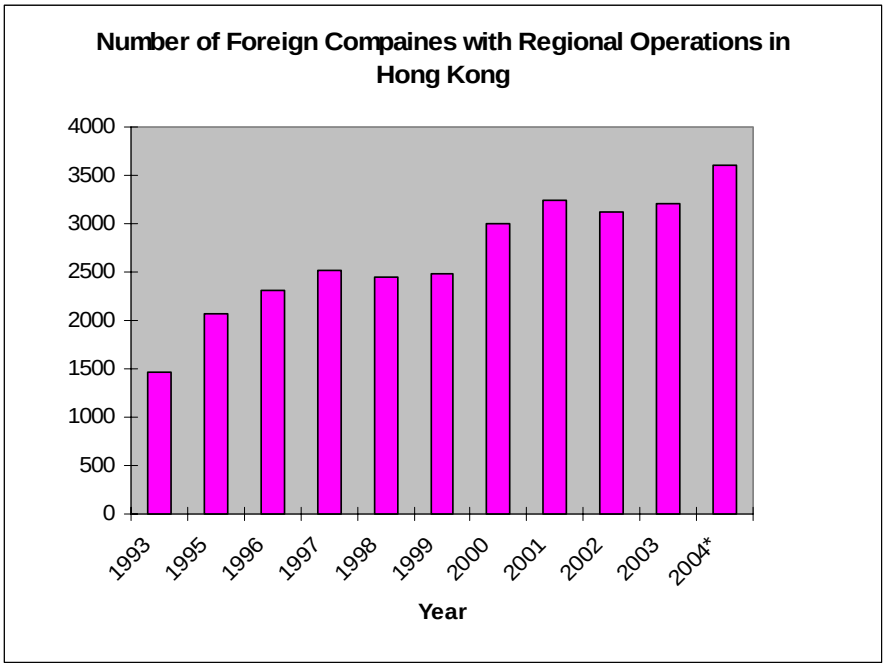

Figure 5: Number of Foreign Companies in Hong Kong

Source: Census and Statistics Department, CB Richard Ellis Global Research & Consulting

*** Foreign Companies are updated as of 1 June, 2004.**

Despite the increase in overseas companies having regional operations in Hong Kong, the expatriate population witnessed a constant decline, with the drop of 'expatriate executives' 3.8 per cent per year. According to the Immigration Department, at the end of the year 2003, the number of expatriate executives was only 113,280. This is largely due to the corporate trend of adopting short-term assignments over long-term relocations.

The reason for the drop of expatriate executives in Hong Kong is due to cost saving of many multi-national corporations (MNCs). Nowadays these corporations usually adopt short-term business assignments over long term relocations, in an attempt to save costs. This increasing trend of sending senior staff for short-term assignments drives the demand for serviced apartments in Hong Kong.

Apart from short term business assignments, Hong Kong's popularity for hosting international conferences and trade fairs also contributes to the rising of business visitors. Figure 6 illustrates the number of events and delegates from places outside Hong Kong between 1994 and 2003. The World Bank and International Monetary Fund (IMF) annual meetings in September 1997, the 2001 Fortune Global Forum in May 2001 and the 16th World Congress of Accountants in November 2002 were all held in Hong Kong. It is also agreed that Hong Kong will host the Sixth World Trade Organization (WTO) Ministerial

Conference and Exhibition of the International Telecommunication Union in mid-December 2005 and 2006 respectively. The choices indicate Hong Kong as a favorite place in the world to do business and host major conferences.

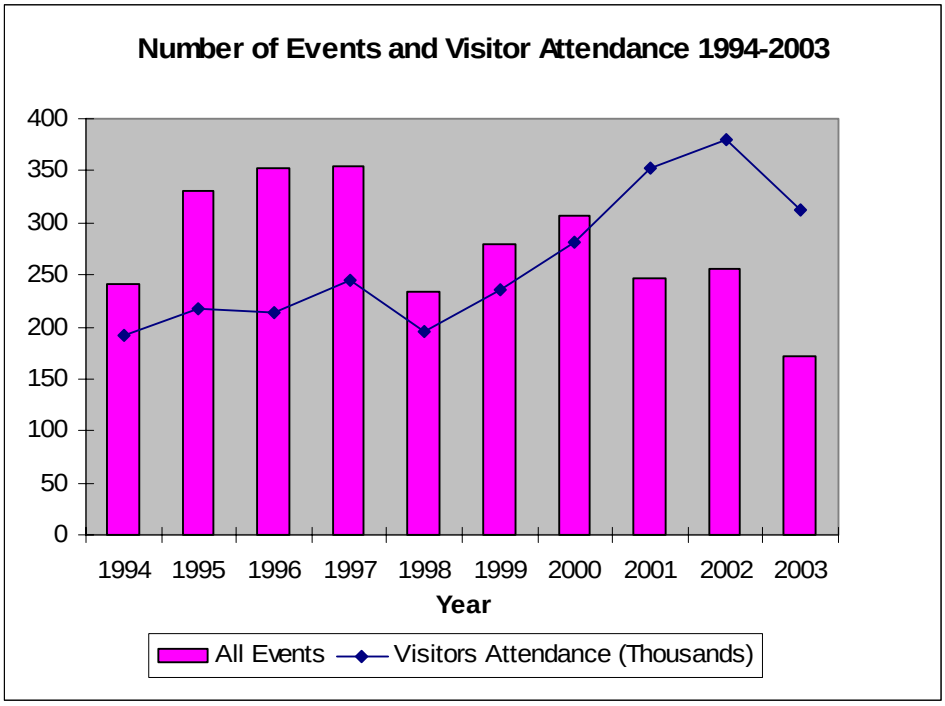

Figure 6: Number of Events and Delegates from Places outside Hong Kong

Source: Hong Kong Tourism Board

*** Events include conventions and exhibitions excluding those attended only by Hong Kong delegates**

Despite the lack of exact figures, Hong Kong is also a popular place for holding corporate meetings and incentive movements, which attracted more than 600 thousands of visitors in 2003, according to Hong Kong Tourism Board.

To conclude, these business travellers coming to Hong Kong for short term business assignments, or conventions and exhibitions act as one of the main drivers for demand of serviced apartments, especially for those who have to spend months in Hong Kong, and those are required to come to Hong Kong frequently and prefer to live in an apartment-like environment rather than staying in hotels all the time. Serviced apartments are thus an appropriate choice for them.

3.2.2. Tourists

Tourism contributes much to sustain Hong Kong's economy every year. Figure 7 shows the number of visitors to Hong Kong during 1994 to 2004.

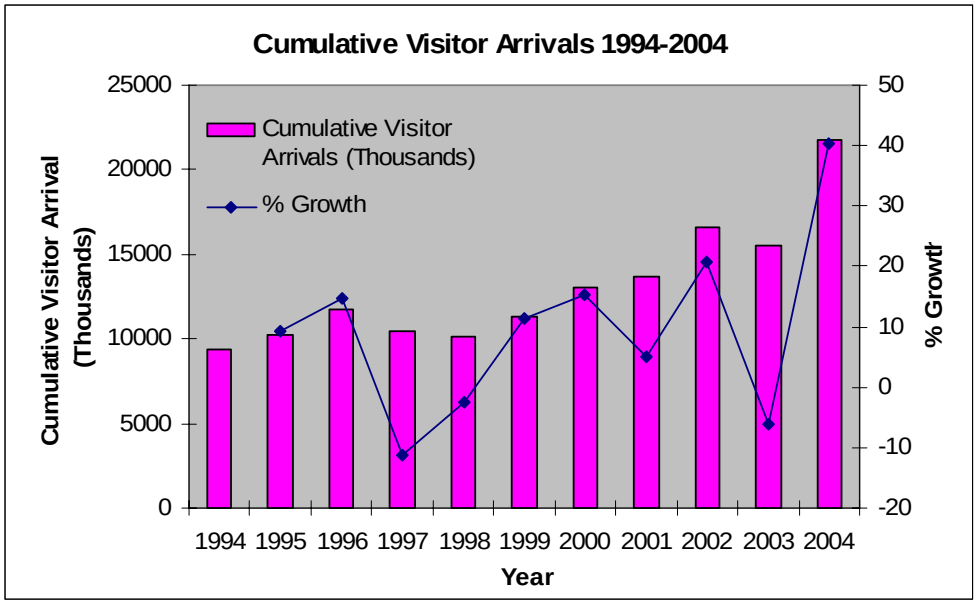

Figure 7: Cumulative Visitor Arrivals 1994-2004

Source: Hong Kong Tourism Board

Despite the outbreak of Severe Acute Respiratory Syndrome (SARS) during the first half of that year, the tourism industry was not hit to a large extent. Till the end of 2003, there were altogether 15.5 million visitors coming Hong Kong, showing only a 6.2% fewer than the 2002 figure, compared with double-digit shortfalls in many other SARS-affected Asian destinations. Tourist arrivals at the end 2004 even surged by 40.4%.

A significant factor contributing to this was the new Individual Visit Scheme implemented from late July 2003, after Hong Kong was delisted as a SARS-affected area. The Scheme is a policy in phases that allows mainland residents in selected cities to visit Hong Kong on an individual basis, rather than exclusively as part of tour groups. The Scheme was initially introduced in 4 designated cities in Guangdong Province but 32 cities to date including Beijing, Shanghai and major cities in Guangdong, Fujian, Jiangsu and Zhejiang. This contributed to a V-shaped recovery number of visitor arrivals in 2003, and setting new monthly records in August, October and December. Figure 8 presents the visitor arrivals by month during 2002 to 2003.

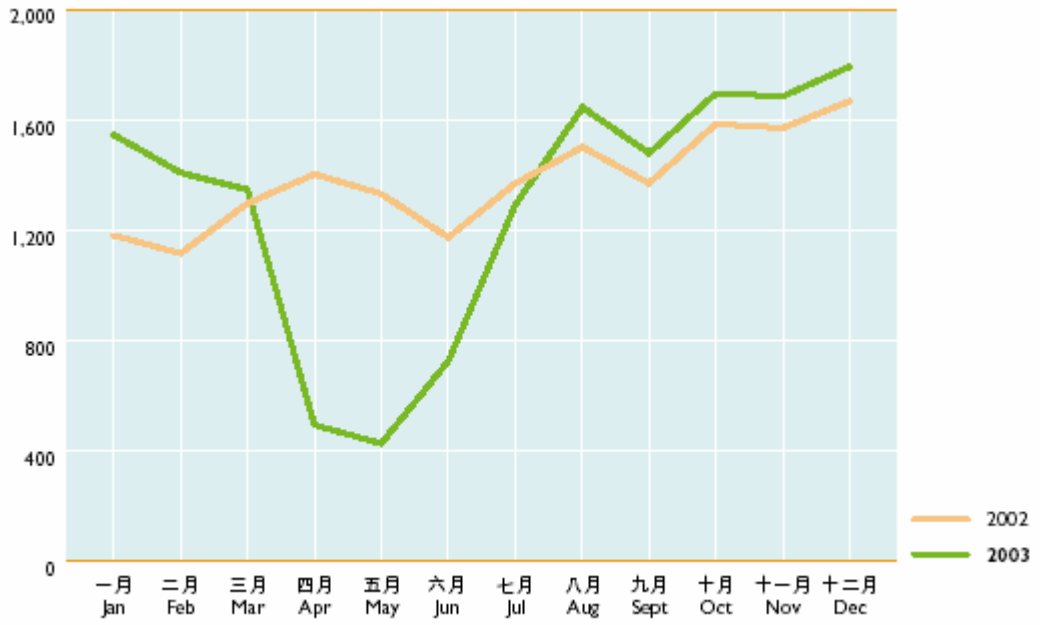

Figure 8: Visitor Arrivals by Month 2002 & 2003 (Thousands)

Source: Hong Kong Tourism Board

Visitors' average length of stay has also increased since 2000. Figure 9 highlights the average length of stay for all visitors. During 2003, visitors' average length of stay increased to 4.1 nights from 3.6 nights in 2002. According to Hong Kong Tourism Board, this was largely due to the growth generated by Mainland China visitors, who tended to stay longer.

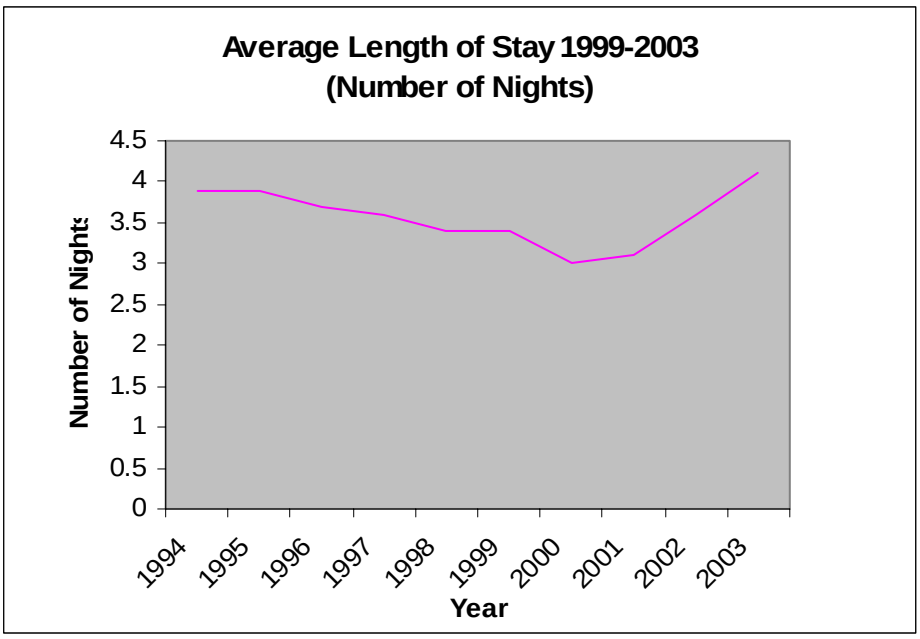

Figure 9: Average Length of Stay 1999-2003 (No of Nights)

Source: Hong Kong Tourism Board

The impact of mainland visitors upon Hong Kong tourism keeps increasing. Mainland visitors now account for more than half of total tourist arrivals, and have reached 11 million in the first eleven months of 2004. Figure 10 illustrates the proportion of Mainland visitor arrivals to total visitor arrivals between 1994 and 2004.

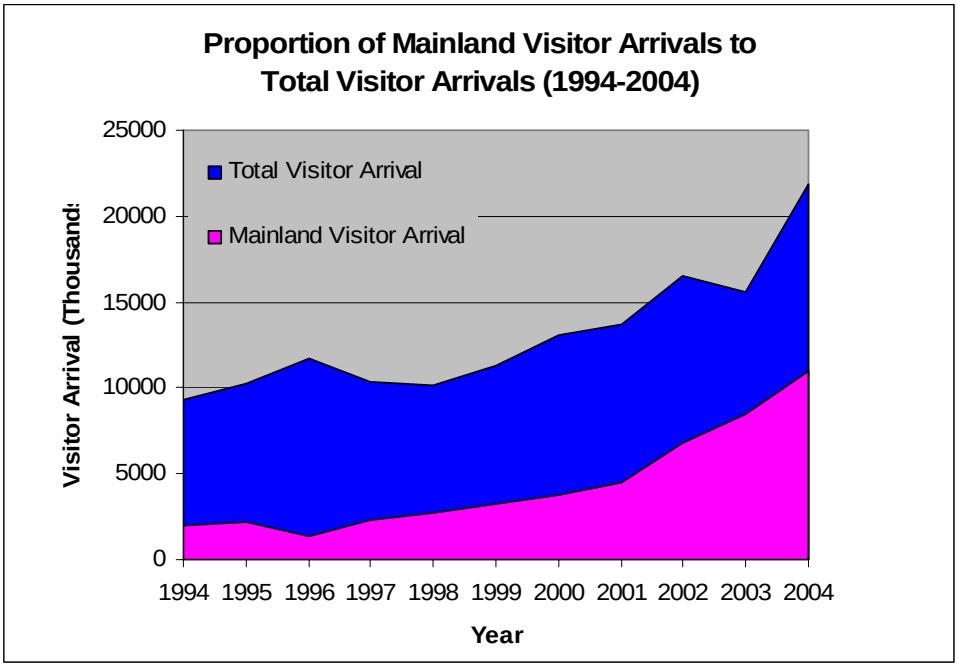

Figure 10: Proportion of Mainland Visitor Arrivals to Total Visitor Arrivals

Source: Hong Kong Tourism Board

This large amount of tourists attracted to Hong Kong every year contributes appreciably to the demand of serviced apartments. After the opening of Hong Kong Disneyland in September 2005, the amount of visitors coming Hong Kong is expected to increase further.

3.2.3. Returning Chinese from Foreign Countries

Returning Chinese from foreign countries seeking employment opportunities in Hong Kong is an increasingly significant source of demand for serviced apartments. As mentioned by Korn/Ferry, a global executive recruitment firm, returning Chinese are popular among multinational companies as they received overseas education and training and can speak both

Chinese and English fluently[11]. As a result, there has been a significant increase in the number of returning Chinese in recent years which may contribute the demand of serviced apartments.

3.2.4. Local Residents

In view of the relatively higher occupancy costs of serviced apartments compared with conventional apartments, serviced apartments are not very popular with local Hong Kong residents in the past. Local people generally only move into serviced apartments when their own homes are being renovated.

However, the appeal of the 'all-ready-to-go' concept and provision of comprehensive services increasingly attracts local high income residents as they can save the expense of purchasing furniture and hiring maids as required when occupying an ordinary apartment.

3.3. Supply

3.3.1. Existing Stock

Serviced apartments in Hong Kong are mainly provided by large local developers: the New World Development Company: Great Eagle, Swire Properties, Cheung Kong Holdings, Sun Hung Kai Properties, for instance. Figure 11 shows the approximate stock of serviced apartments in Hong Kong in the past 25 years. As of May 2004, there are a total of 69 Serviced Apartment developments collectively providing 9,006 units in Hong Kong.[12] Information regarding the major developments of serviced apartments in Hong Kong is illustrated in Table 1.

[11] Lee, E. (2004), China Beckons as Management Vacancies Soar, *Career Times*.
[12] CB Richard Ellis Hong Kong (2004), *Hong Kong Serviced Apartment Market Update*. Hong Kong: CB Richard Ellis Global Research.

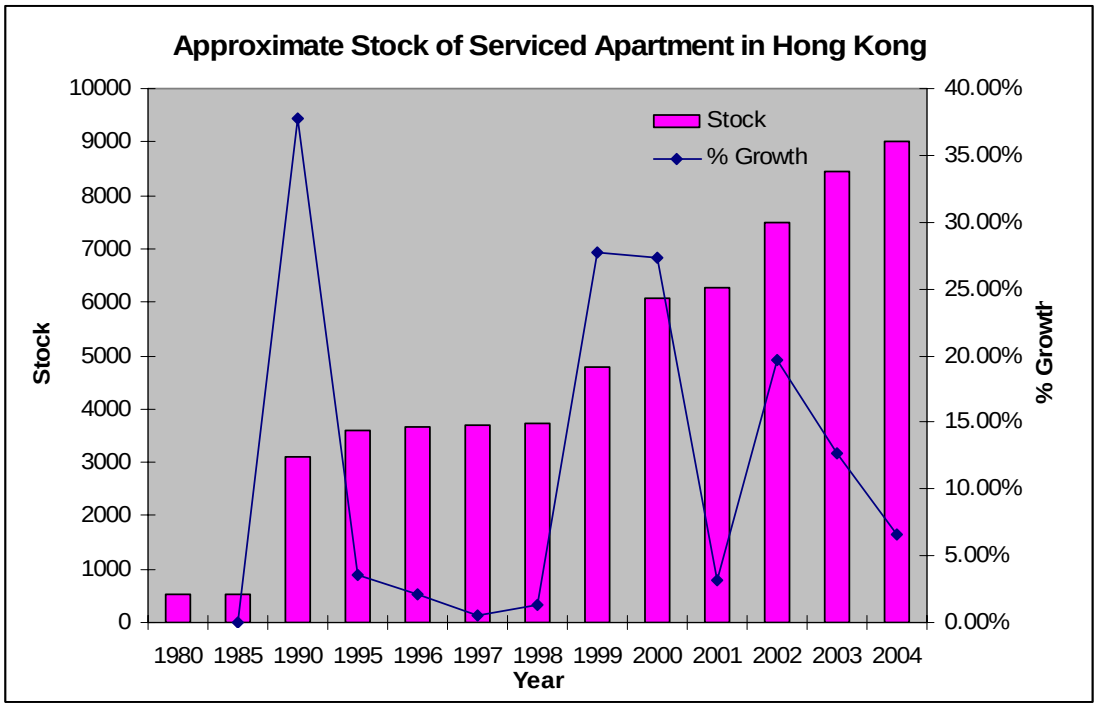

Figure 11: Approximate Stock of Serviced Apartments in Hong Kong 1980-2004

Source: South China Morning Post, CB Richard Ellis Global Research and Consulting, other sources

Amongst the existing stock, the majority are located on Hong Kong Island, with 4,741 units or 52.6 per cent of the total. This is followed by Kowloon and the New Territories, with 3,025 units (33.6 per cent) and 1,240 units (13.8 per cent) respectively.

Name of Apartment	Developer	Location	No. of Units	Size Range (s.f.)	Year of Completion
Broadwood Apartments	Cairn Hill Group	Happy Valley	24	834	1995
Central 88	Wincome Management	Central	74	440-1430	2004
Convention Plaza Apartments	New World Development Company Ltd.	Wan Chai	500	543-1872	1989
Daisy Court	Hanlun Habitats	Mid-Levels	56	480	1996
Eaton House - Blue Pool Road	Great Eagle Hotels International	Happy Valley	60	487-668	1989
Eaton House - Village Road	Great Eagle Hotels International	Happy Valley	50	383-570	1988
Eaton House - Wan Chai Gap Road	Great Eagle Hotels International	Wan Chai	73	422-471	1990
Gateway Apartments (Hampton Court & Sutton Court)	Wharf (Holdings) Limited	Tsim Sha Tsui	500	712-2931	1999
Grand Plaza Apartments	Hang Lung Properties	Quarry Bay	450	410-1236	2003
Harbour Plaza Metropolis Hotel	Cheung Kong Holdings & KCR	Hung Hom	690	355-1087	2003
Hong Kong Parkview	Chyau Fwu	Tai Tam	200	700-1320	1989
Lanson Place (The Waterfront Tower V)	Wing Tai Holdings Ltd.	Tsim Sha Tsui	164	1210-2600	2002
Manhattan Heights	Cheung Kong Holdings & Fook Lee Holdings Ltd.	Kennedy Town	270	610-950	2000
New World Apartments	New World Development Company Ltd.	Tsim Sha Tsui	518	338-5909	1980
Ovolo	Hind Hotels and Properties Ltd.	Central	21	1200	2001
Parkside	Swire Properties	Pacific Place	243	1220-2650	1990
Peach Blossom	Hanlun Habitats	Mid-Levels	50	560-620	2001
Shama Causeway Bay	Shama Group	Causeway Bay	110	380-1430	2002
Shama Central	Shama Group	Central	56	500-1250	2001
Shama Wanchai	Shama Gourp	Wan Chai	9	400-1586	2000
The Atrium	Swire Properties	Pacific Place	136	606-3388	1989
The Ellipsis	Dorfit Properties Ltd	Happy Valley	79	622-1235	2002
The Pinnacle	Henderson-Miramar Group	Tsim Sha Tsui	282	503-973	2003
338 Apartment	South Jacob Ltd	Sheung Wan	62	547-1366	2004

Table 1: Information for some Major Developments of Serviced Apartments in Hong Kong

3.3.2. Alternatives to New Constructions

Apart from new constructions, developers in Hong Kong have also converted existing buildings into serviced apartments. In view of the strong demand for high quality serviced apartments in easily accessible locations, developers have been prompted to purchase existing properties, often Grade B office towers or older residential apartment blocks to convert them into serviced apartments. As a result, new serviced apartments completed in recent years are mainly small-scale and single-block projects.

In addition, the profitable business of serviced apartments has prompted some hotel operators (three-star hotels in particular) to convert some rooms into serviced flats. Leasing rooms in long-stay packages guarantees hotel operators able to maintain a higher occupancy rate at lower running costs. The situation is especially obvious during the tourism slump years, when hotel operators are under pressure to fill rooms.

Cheung Kong (Holdings) is an active player in leasing hotel rooms as serviced flats. The group has long-stay rooms for lease at Harbour Plaza Hotel in North Point, Harbour Plaza Resort City in Tin Shui Wai, Harbour Plaza Metropolis Hotel in Hunghom and Horizon Suite Hotel in Ma On Shan. Another outstanding example is the Grand Plaza Hotel, in Quarry Bay. Hang Lung Properties completely revamped the hotel into serviced apartments in 2003.

Examples of serviced apartment projects on the market adopting these types of conversion are shown in Table 2.

Name of Development	Developer	Year of Completion	District	Original Use	No. of Units
Shama SoHo	Shama	2000	Mid-levels	Residential	10
Shama Wan Chai	Shama	2000	Wan Chai	Residential	9
Ovolo	Hind Hotels and Properties Ltd.	2001	Central	Office	21
Shama Central	Shama	2001	Central	Office	56
Shama Times Square	Shama	2002	Causeway Bay	Office	110
Grand Plaza Apartments	Hang Lung Properties	2003	Quarry Bay	Hotel	450

Table 2: Serviced Apartment Conversion Projects

3.3.3. Town Planning Board Decision

Serviced apartments normally cannot be disposed of except as a whole under previous rules. However, following the Lands Department's proposal for relaxation of controls in land lease conditions in 1999, the strata-title sale of serviced apartments was allowed. According to Brooke[13], this resulted in a rush of change in use of land applications, many of which were "*barely disguised applications to build normal flats for sale and many in locations where demand for traditional serviced apartments was highly questionable*".

This was because the regulatory change enabled developers to cash in as they do in conventional residential projects. Where the sites were zoned either as Comprehensive Development Area or Commercial, it was possible for the developer to secure a significantly higher non-domestic plot ratio through the submission of an application for serviced apartments. As commented by market consultants[14], this was unfair since developers could sell serviced apartments on a strata-title basis securing a higher plot ratio than normal residential projects. In addition, there were also fears that such multiple-owned serviced flats would be used as long-term homes. Lands Department also encountered technical difficulties in drafting a lease of strata-title sale for serviced apartments.

As a result, in June 2000, the Town Planning Board deleted the category of serviced apartments from the Notes of all statutory plans.[15] Developers can no more apply to build such properties under Section 16 of Town Planning Ordinance. Nevertheless, they can incorporate serviced suites into hotel or residential projects.

If the serviced apartment units are to be developed as part of hotel establishment, it will be considered as 'hotel' and so the provision for 'hotel' use under the Notes of the relevant Outline Zoning Plan is needed for the development of serviced apartments. If the serviced apartment units are to be developed as conventional residential flats with services provided as a marketing tool, they will be regarded as a kind of residential development. Such development will be subject to the provision for 'flat' use under the Notes of the relevant statutory plans.

[13] Brooke was a member of the Town Planning Board at that time.
[14] Woo, R. (2000) Move to drop serviced suites raises eyebrows Industry left wondering after planning board limits developers' rights, *South China Morning Post*. 16/7/2000, p3.
[15] Town Planning Board (2000), *Town Planning Board Guideline (TPB PG No. 2B).* Hong Kong: Hong Kong Government Printer.

Since then, there will only be residential leases which allow strata-title sale of the finished properties, or hotel leases which the finished products have to be sold as a whole.

3.3.4. Impact of Town Planning Board Decision

Since serviced apartments can now only be built on land under residential or hotel leases, this would lessen developers' interest in building serviced apartments in Hong Kong.

This is because, on one hand, developing serviced apartments under residential leases means that developers would suffer from lower plot ratio. On the other hand, when serviced apartments are built under hotel leases, although they enjoy commercial land-use plot ratios which are higher than residential-use lots, hotel developments involved more restrictions. For instance, hotels have to provide certain car-parking spaces. But a small site was not likely to be developed as a hotel because of a lack of space for car parks. In addition, an up-to-standard hotel may also incur a higher building cost than serviced-apartment projects.

These factors may result in reduction of the future supply of serviced apartments, leaving the market with fewer choices and increasing the cost of enjoying such properties.

3.3.5. Future Supply

Before Town Planning Board's decision in 2000, many developers have already been granted approval to convert some of their lands from commercial and industrial use to serviced apartment use. These approved applications have guaranteed the supply of serviced apartments during 2002 to 2006, as summarized in Table 3.

Name of Development/ Site	Developers	District	Year of Completion	Number of Units
The Pinnacle	Henderson Miramar Group	Tsim Sha Tsui	2002	282
Metropolis Apartments	Cheung Kong Holdings & KCR	Hung Hom	2002	620
Furama Court 51-61 Carnarvon Road	Lai Sun & Guoco Group	Tsim Sha Tsui	2005	168
3 Jordon Road	Unknown	Jordon	2004	48
Hanoi Road	New World & Urban Renewal Authority	Tsim Sha Tsui	2004	982
Chelsea Court 90-114 Yeung Uk Road	Sun Hung Kai	Tsuen Wan	2005	1,624
The Four Seasons MTR Hong Kong Station	Sun Hung Kai & Henderson	Central	2005	519
MTR Kowloon Station	Sun Hung Kai and MTRC	Tsim Sha Tsui	2005	600
116-122 Yeung Uk Road	Nan Fung Development Ltd.	Tsuen Wan	2006	452
Rambler Crest	Hutchison Whampoa	Tsing Yi	2004	504
Indihome 124-142 Yeung Uk Road	Kwong San Hong	Tsuen Wan	2006	960
			TOTAL:	**6,579**

Table 3: Town Planning Applications for Serviced Apartments Use before the Issue of TPB-PG No. 2B

Source: CBRE Global Research & Consulting and Chesterton Research

The future supply of serviced apartments is expected to shift from business districts to Tsuen Wan District. Although there was significant new supply in secondary areas, the actual number available for lease as conventional serviced apartments under single ownership would be significantly less. For example, Chelsea Court is not a "traditional" serviced apartment project where the developer retains all units for lease. Instead, it is to be strata-titled for sale, similar to the Cheung Kong (Holdings) Rambler Crest serviced apartment project in Tsing Yi.

3.4. Characteristics

3.4.1. Geographic Distribution[16]

The majority of serviced apartments are located on Hong Kong Island, contributing 52.6 per cent of the total, followed by Kowloon and the New Territories, with 33.6 per cent

[16] CB Richard Ellis Hong Kong (2004), *Hong Kong Serviced Apartment Market Update*. Hong Kong: CB Richard Ellis Global Research.

and 13.8 per cent respectively. Figure 12 shows the breakdown of the supply of serviced apartments on Hong Kong Island. Wan Chai and North Point are the majority of supply, which together accounted for 42.5 per cent of the total supply on Hong Kong Island.

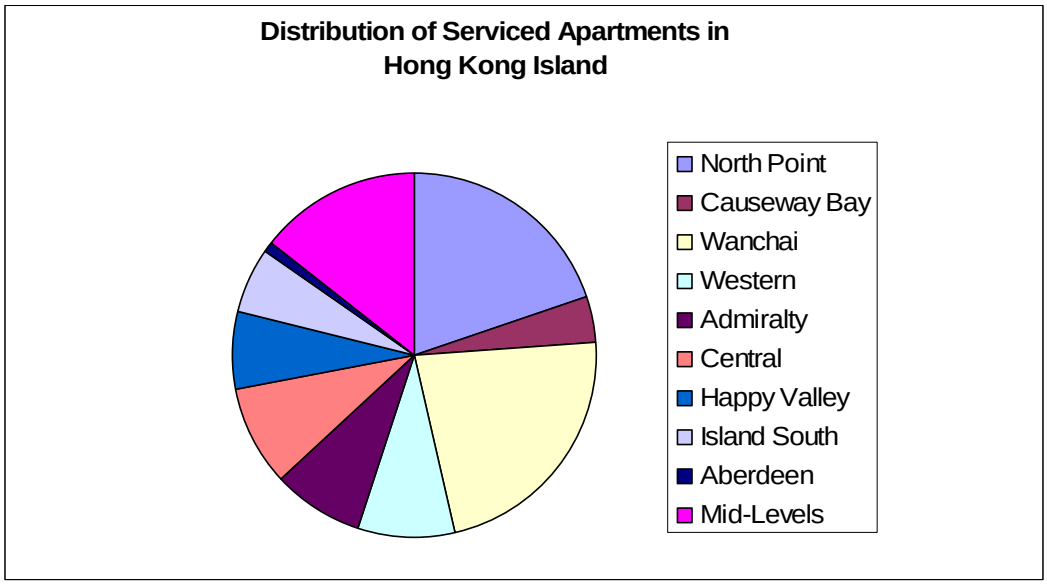

Figure 12: Distribution of Serviced Apartments in Hong Kong Island

Source: CBRE Global Research

On the Kowloon side, Tsim Sha Tsui and Hung Hom have the highest concentration of serviced apartments, together providing 88.5 per cent of the total stock in Kowloon. In the New Territories, Harbour Plaza Resort City in Tin Shui Wai alone provides 88.9 per cent of the total stock there.

3.4.2. Unit Size and Mix[17]

Figure 13 highlights the unit mix of serviced apartments in Hong Kong. Most of the existing serviced apartments are studio units and one-bedroom units. Studio units are usually below 500 sq ft, accounting for 35 per cent of the total stock. The size range of one-bedroom units varies widely, from 400 sq ft to more than 1,000 sq ft, and account for 34.9 per cent. Two-bedroom units, and three and four bedroom units account for 22.1 per cent and 8 per cent of the total stock respectively.

[17] CB Richard Ellis Hong Kong (2004), *Hong Kong Serviced Apartment Market Update*. Hong Kong: CB Richard Ellis Global Research.

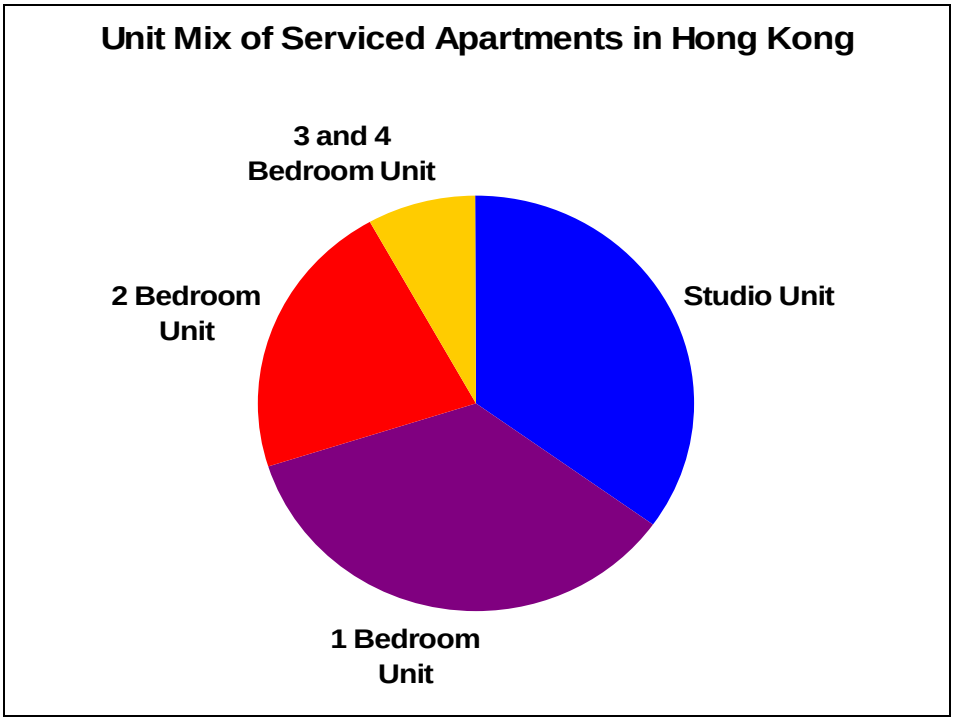

Figure 13: Serviced Apartment Unit Mix in Hong Kong

Source: CB Richard Ellis Global Research & Consulting

3.4.3. Services and Amenities Provided

As shown in Table 4, typical services and amenities provided in serviced apartments in Hong Kong include, but not limited to:

Services	Amenities
24-hour reception	BBQ grill
24 hour professional security	Billiards room
Babysitting	Children's playroom
Breakfast	Conference room
Concierge service	Golf driving net/ video golf simulator
In-room broadband internet access	Gym
Limousine service	Jacuzzi
Maid service	Sauna
Newspaper delivery	Solarium
Secretarial service	Steam bath
Shuttle bus service	Swimming pool
Towel and linen service	Television with satellite and/or cable TV channels
Valet service	Tennis and squash court

Table 4: Typical Services and Amenities Provided in Serviced Apartments in Hong Kong

It is worth noting that there has been a new segment of serviced apartments in the market which are usually located in convenient locations, but the developments tend to be more compact in size than that of those top-end serviced apartments. They are mostly conversion projects as described in 3.3.2. They do not have any on-site recreational facilities. Instead memberships or discount schemes to nearby club houses or fitness centres are offered to their tenants. These act as value-added services to attract tenants. Ovolo and Shama Group are two serviced apartment operators offering such kind of memberships.

3.4.4. Lease Term

Flexible lease terms are one main attraction of serviced apartments, as some tenants prefer to avoid signing a minimum two-year lease with a conventional apartment unit. The minimum lease durations of serviced apartments normally range from 1 day to 1 month. However, due to planning restrictions on the site, some serviced apartments required a minimum stay of 90 days. Figure 14 shows the distribution of minimum lease terms of serviced apartments in Hong Kong.

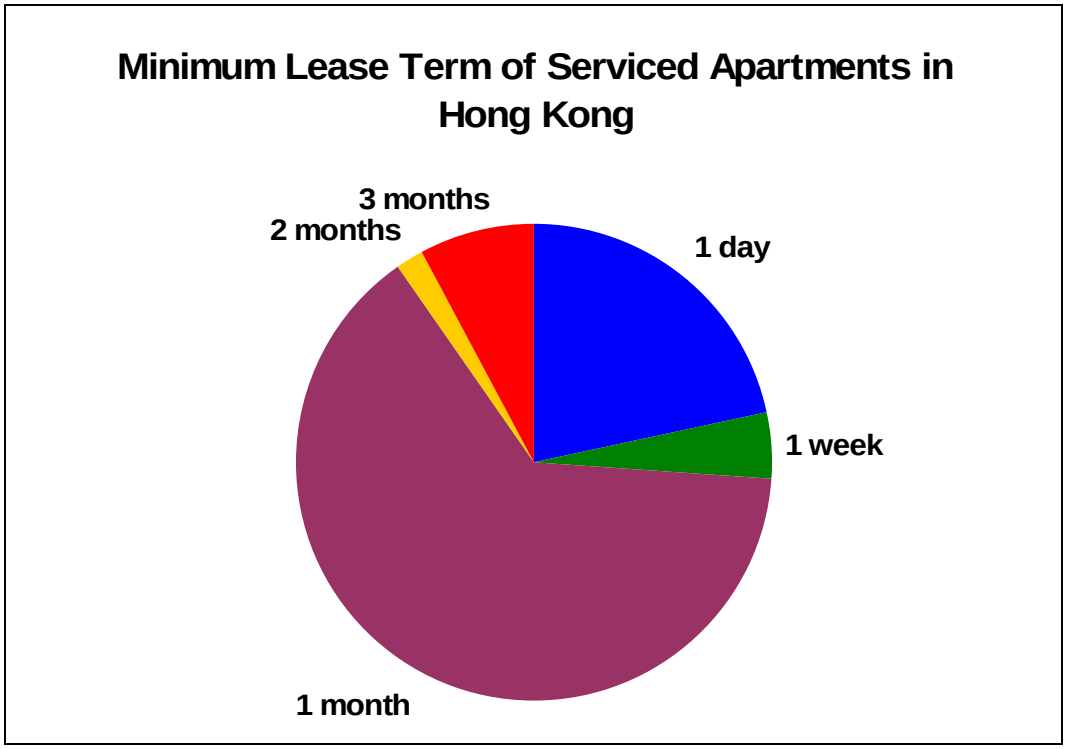

Figure 14: Minimum Lease Term of Serviced Apartment in Hong Kong

Source: Websites and Brochures of and Phone Interviews with different Serviced Apartments in Hong Kong

3.4.5. Rental Charge

In the serviced apartment market, rent is expressed as a "package" – the total cost of occupying a unit. Management fees, government rates, utilities charges and all other expenses (except international phone calls) and services provided have already been included in the 'package', regardless of whether the tenants need those services or not. However, more and more serviced apartment operators exclude utilities charges from the rental package. Instead, they install meters in every unit in order to calculate the utilities payment. This approach offers the tenants' energy saving incentive. Nowadays there are about 35% of serviced apartment projects in Hong Kong adopt this approach.

In general, monthly asking rents for serviced apartments as at November 2004 are as follows:

Category of Serviced Apartments	Range of Size	Rent Per Square Feet Per Month
Luxury	Starting from 338 sq ft	$33 to $59
Non-luxury	250 sq ft to 1,570 sq ft	$20 to $63.2

Table 5: Monthly Asking Rents for Serviced Apartments as at November 2004

3.5. Trends of the Serviced Apartment Market

As the economy recovers from Asian Financial Crisis and SARS and the number of tourists and business travellers visiting Hong Kong increases, demand for serviced apartments is expected to keep growing. Owing to the limited amount of new supply expected to come on stream in the next two years, the outlook of serviced apartment market is optimistic.

In the future, a large portion of serviced apartments are expected to be developed under the 'flat' use in the statutory plans, as this can appreciably enhance the property value for conventional residential flats. However, not much serviced apartments are expected to be developed under hotel establishments. With tourism rebound and mainland visitors coming to Hong Kong increase, the rental return from the hotel establishments is also expected to rise and so the incentive for the developers to develop their hotel site into serviced apartments is weakened. This is because average room rates are higher on a daily basis than on longer stay packages. When the hotel market improves, the trend of converting hotel rooms into serviced flats is expected to diminish.

As a result, the amount of local residents buying serviced apartment flats is expected to be increase since the services and facilities provided as part of the housing package is appealing to them. However, the choice of serviced apartments for the increasing business travellers and tourists will be limited even the completion of some of the serviced apartment projects in 2005 and 2006, as shown in Table 3, because some of them are expected to be sold as strata-title rather than leasing as conventional serviced apartments under single ownership to ensure the early reimbursement of capital outlay by developers. Finally, it is also worth noting that the future geographical distribution of serviced apartments is expected to be shifted from Hong Kong Island to Kowloon and the New Territories.

Chapter 4: Methodology, Variables and Data

In previous chapters, the determinants of residential apartment values, and the background of the Hong Kong serviced apartment market have been reviewed. They give insight into what factors should significantly affect the rental level of serviced apartments. In order to construct a model which can be applicable to the local serviced apartment market, the methodology has to be studied first in order to be familiar with the techniques used in the regression analysis. The variables to be included in the hedonic price model are also needed to be clearly defined to facilitate the data collection process. In addition, why they are included in the model and how they are predicted to affect the rental level should also be clearly stated in order to compare between the expected results and the empirical results.

This chapter is divided into three parts. The first part illustrates in detail the methodology used in this dissertation, the second part explains the variables selected in the hedonic price model, and the third part describes the data collected in this study.

4.1. Methodology

The study aims at examining determinants of serviced apartment rent. Two assumptions are needed to facilitate the study:

1) every tenant has all information of all serviced apartments in the market and is free to choose which serviced apartment unit to reside; and
2) every tenant has made their utility maximizing choice regarding which serviced apartment unit to reside.

The methodology to be adopted in this study is the hedonic price model as proposed by Rosen (1974). The concept of which has already explained in the Literature Review. This section discusses the structure of the hedonic function, and the criteria of selecting the functional form. In addition, techniques for using regression analysis are also discussed, including the use of dummy variables and time variables. Two test statistics, namely the t-statistics and the coefficient of determination (R^2), and two technical problems of regression, heteroscedasticity and multicollinearity, are also introduced.

4.1.1. Structure of Hedonic Price Equation

As introduced in Chapter 2, the influence of the four sets of attributes, namely, physical, locational, amenity and service attributes on serviced apartment rent is to be examined. As a result, the following model is utilized: [18]

$$\text{Rent} = f(\text{P, L, A, S})$$

where

Rent = the market rent on the serviced apartment unit;

P = a set of physical attributes for the unit;

L = a set of location attributes for the apartment;

A = a set of amenities provided for the apartment; and

S = a set of services and occupancy restrictions for the apartment.

If a linear relationship between rent and independent variables is assumed, the equation can be written in this way:

$$\text{Rent} = a_0 + \sum a_i P_i + \sum b_j L_j + \sum c_k A_k + \sum d_m S_m + \varepsilon$$

$$\Delta \text{ Rent} / \Delta P_i = a_i$$

$$\Delta \text{ Rent} / \Delta L_j = b_j$$

$$\Delta \text{ Rent} / \Delta A_k = c_k$$

$$\Delta \text{ Rent} / \Delta S_m = d_m$$

where

a_0 = Constant term;

a_i, b_j, c_k and d_m = Regression coefficients of corresponding variables;

P_i = Variables for physical attribute i;

L_j = Variables for locational attribute j;

A_k = Variables for amenity k;

S_m = Variables for service m; and

ε = Stochastic or error term.

The corresponding regression coefficient a_i, b_j, c_k and d_m can be used to quantify the change in Rent when there is a unit change in any of the housing attributes P_i, L_j, A_k and S_m, holding other attributes constant. For instance, one unit change in P_1 will result in a_1 unit(s)

[18] The model is modified from those developed by Sirmans and Benjamin in previous literature.

changes in Rent, provided that all other variables are kept constant. This means the hedonic price or implicit marginal price of any individual housing attribute can be expressed by the partial derivative of the corresponding attribute. In other words, the estimated coefficients of the independent variables are interpreted as estimates of an implicit price that households are willing to pay for more of each attribute.

4.1.2. Regression Analysis

Multiple regression analysis is used to estimate the tenants' valuations for every individual attribute. Regression analysis is a statistical technique for examining the relationship between the dependent and independent variables. The most common method of estimating the parameters of the regression model is the Ordinary Least Squares (OLS) technique, which minimizes the residual sum of squares (sum of the squares of the differences between the actual and the forecast values of the dependent variable) to find the best regression line.

4.1.3. Dummy Variable

Dummy variables are used to model qualitative factors which affect the dependent variable. They are commonly used to deal with discontinuous factors which take on only two values, either 0 or 1. The regression coefficients of the dummy variables measure differences in intercepts. They help to explain the effect (positive or negative and its magnitude) when the particular condition is satisfied or not.

In this study, they are used to describe whether a particular attribute is available in a serviced apartment unit or not. For the presence of a particular attribute in the model, the variable representing it will be set equal to 1, and 0 otherwise.

4.1.4. Choice of Functional Form

The correct specification of hedonic relationship requires both the appropriate functional form and appropriate list of independent variables. Regarding choosing list of independent variables, as mentioned in Literature Review, Butler (1982) suggested that only those attributes that are costly to produce and yield utility should be considered in the regression equation in order to minimize misspecification.

Regarding choosing the appropriate functional form, Linneman (1980) demonstrated that 86 percent of overestimation obtained from his hedonic analysis was due to inappropriate functional form. This showed that a correct functional form is crucial for the accurate estimation of the hedonic relationship.

Despite having a long history, the theory of hedonic price provides very little guidance on the choice of the proper functional form (Butler, 1982). There are many functional forms, such as linear, log, log-linear, semi-log, quadratic, exponential, etc. Among these options, linear and semi-log are commonly used in hedonic price models.

To select a correct functional form, Rosen adopted the "goodness of fit" (R^2) criterion, as discussed in Section 4.1.7.1. Sometimes the functional form for the hedonic price model can be deduced from a prior knowledge of the relationship between the dependent and independent variables. For example, properties at higher floor levels probably achieve higher market price since they enjoy better views and far away from traffic noise. However, it is difficult to predict the appropriate functional form, especially when many housing attributes are included together which result in a combined contribution on the property price.

In case no prior information is available, the functional form can still be estimated by trial and error based on empirical observation. In this case, a linear function should always be used as the first attempt. If the linear function fails, more flexible functional forms can be tested: the polynomial function and Box-Cox transformation for example. Many researchers prefer the Box-Cox transformation[19] as the transformation process results in a better model specification (So et al., 1997). However, the Box-Cox flexible form requires sufficiently large volume of data and a maximum likelihood estimates (MLE) software. In addition, the Box-Cox transformation cannot be applied to dummy variables, since the transformation can only performed on variables that are strictly positive.

Comparing the linear and Box-Cox specification, linear specifications have been employed extensively in previous studies. Gordon and Richardson (1982) argue that there is no clear evidence that the linear specification is inferior to the alternative specification. Chau and Ng (1998) use both linear and Box-Cox specification of hedonic equation to study the effect of improvement in public transportation to the property prices along the transportation

[19] This technique was developed by Box and Cox (1964) and was further developed by Halvorsen and Pollakowski (1981) and Spitzer (1982). It is used to search for the best specification where the theory is not sure about the functional form.

line. Their results suggest that the linear specification is not significantly different from the more flexible Box-Cox specification.

In this dissertation, since the model involves many variables, the overall effect of each individual housing attribute on the serviced apartment rent is hardly predictable. The functional form will be estimated by trial and error based on empirical observation. The linear functional form will thus be employed first.

4.1.5. Time Effect

The transacted rents of serviced apartment units are required to construct the dependent variable. In order to collect sufficient amount of transaction records, they spread over the time horizon. This induces a time effect on the data since the transacted rents of serviced apartments are always affected by the changes of the economic environment. If neglecting the time effect, there will be bias on those transaction records which may lead to the over or under estimation of the real rents. Thus, it is necessary to adjust the data so as to eliminate the time effect before applying the hedonic price model.

Two methods are usually adopted to deal with the time effect. They are using price deflators and using dummy variables to represent different periods of time. The former enables adjusting all transacted rents at different periods of time to a common base, whereas the later enables the coefficients of the dummies to show the time effect on the properties under respective economic environment.

In this study, the transacted rents will be deflated using the "implicit price deflator of GDP" (or GDP deflator in short) from Census and Statistics Department. Although Rating and Valuation Department has not published any serviced apartment rental index, CB Richard Ellis Hong Kong has published one. The underlying reason for not using this rental index to deflate serviced apartment rents is due to the fact that this index is constructed using the asking rental levels of certain selected serviced apartment units in Hong Kong. There is a fear that this index may not be able to truly reflect the rental movement since the rental level and movement of asking rents are different from that of transacted rents.

The GDP deflator is obtained by dividing the current price GDP by the constant price GDP. It is generally used as a broad measure of overall inflation in the economy. It takes account of all price changes relating to consumption, investment, exports and imports. As a

result, the effect of inflation will be eliminated theoretically through deflating the serviced apartment rents by using the GDP deflators.

Although the use of time dummies helps capture market-wide changes in rents that are not captured by the housing attributes variables, the reason for not using time dummies is that the model constructed in this study has already involved many independent variables. If time dummies are to be used, further more independent variables are required to incorporate in the model, especially when the time interval is divided into shorter periods. The coefficient of determination (R^2), as discussed below, tends to increase as more independent variables are added to the equation, irrespective of whether these independent variables incorporated are significant or not. This may results in a much lower F-statistic.[20]

4.1.6. Technical Problems for Regression Models

Before the regression model is estimated, two problems have to be tackled first. They are the multicollinearity and heteroscedasticity problems.

4.1.6.1. Multicollinearity

Multicollinearity refers to high correlations between two or more independent variables. This results in inapplicability of t-statistics and difficult interpretation of regression coefficients. The estimated equation will be misleading in terms of which features are important. The regression coefficients might also not provide an accurate estimate of the market value of various features.

A model with a large number of variables, particularly if they measure similar attributes, is likely to have a high degree of multicollinearity. Since there are large number of variables that potentially explain serviced apartment rents, this problem is unavoidable. The problem will be particularly serious for the set of amenities variables such as gym, sauna, Jacuzzi, etc., as exhibited by previous studies.

Regarding the multicollinearity problem potentially occurred in the set of amenities variables in this study, the author has attempted several specifications to minimize the problem. This will be explained in Section 4.2.2.3. However, multicollinearity occurred

[20] F-statistic is used to test the significance of the R^2 statistic, as discussed in Section 4.1.7.1. In this study, the use of time dummies results in a much lower F-statistic than that of GDP deflators (247 vs. 168).

among other independent variables will be ignored if the regression results confirm the expected signs of the variables, regardless of the under-estimated t-value.

4.1.6.2. Heteroscedasticity

The second issue that needed to be resolved is heteroscedasticity It occurs when variance among error terms are not the same. Four causes may contribute to this:

- some data are measured more accurately than the others;
- variance of error term(s) correlate with one of the independent variable;
- effects of certain independent variables are not taken into account; or
- mis-specification of the functional form.

This problem renders the t-statistic and therefore the method of construction of confidence interval of forecast not applicable. White's (1980) test can be employed to verify the existence of this problem. In case heteroscedasticity is found to exist, data transformation, weighted least square method and White adjustment are the three remedies to solve the problem.

The estimates produced in this study will be treated with the White adjustment if heteroscedasticity is found to exist. This is to use a heteroscedasticity consistent covariance matrix estimator to deal with the presence of unknown heteroscedasticity.

4.1.7. Test Statistics

From the regression analysis, two test statistics, coefficient of determination (R^2) and t-statistics (t) are of paramount importance to evaluate the regression results. They are explained in the following paragraphs.

4.1.7.1. Coefficient of Determination

The coefficient of determination indicates the proportion of variation in the dependent variable explained by the variation in the independent variable(s). It therefore often used to describe how good the data fits with the model. The value of R^2 ranges from zero to one. The greater the R^2, the better the data fits with the model.

For example, if $R^2 = 0.7$, this means 70% of changes in the dependent variable is explained by the changes of the independent variables. The remaining 30% variations in the dependent variable are unexplained by the independent variables in the equation.

4.1.7.2. t-statistics

As discussed above, the regression coefficients measures the changes in the dependent variable associated with a unit change in the corresponding independent variable holding all other factors constant. To test the statistical significance of the effect of the independent variable on the dependent variable, the t-statistics is required.

The larger the absolute value of t, the less likely the regression coefficient of this independent variable equals 0 and hence the more significant the variable. When it is 95% sure that the regression coefficient is non-zero, this means the regression coefficient at the 5% level and the chance that coefficient equals 0 is only 5%. If the absolute value of the calculated t is higher than the critical t (t_c) for a given significance level (x%) and degree of freedom[21], then the coefficient is said to be "significant at the x% level" or "significant at the (1-x)% confidence level".

In this study, an independent variable will be regarded as insignificant if it is not significant at the 90% confidence level.

4.2. Selection of Variables

This section discusses the variables used in the empirical model, including their meanings, reasons for inclusion, and expected signs. Table 6 shows the list of variables and the corresponding definitions:

[21] Degree of freedom (d.f.) associated with a t-statistic is the number of observations (N) minus the number of independent variables (k) minus one, i.e.

$$d.f. = N - k - 1$$

Dependent Variable	
ln(Rent) (RENT)	
Independent Variables	
Attributes	
Physical	Age (AGE)
	Internal Floor Area (IFA)
	Floor level (FLOOR)
	Number of bedrooms (BED)
	Number of en suite bedrooms (ENSUITE)
	Balcony (BAL)
Locational	Distance to the nearest MTR station (MTR)
	Central or Admiralty (CA)
	Causeway Bay or Wan Chai (CWBWC)
	Tsimshatsui (TST)
	Sheung Wan (SW)
Amenities	Sea view (SEA)
	Parking (PARKING)
	Miscellaneous amenities (MISC)
Services and Occupancy Restrictions	Free in-room broadband internet access (NET)
	Number of maid service(s) per week (MAID)
	Lease term (TERM)
	Utilities paid (UTILITIES)

Table 6 Variables used in the Hedonic Price Model

Detailed descriptions of different variables and reasons for their incorporation into the model are explained below.

4.2.1. Dependent Variable

The natural log of real transacted rents of serviced apartments is used as the dependent variable. The real rents are calculated by dividing the nominal rents by the GDP deflators. The reason for using the natural log form of real rents as the dependent variable in the hedonic equation is to yield the percentage change in rent that results from one-unit increase in the particular characteristic. This is more suitable to study the subject of interest.

4.2.2. Independent Variables

The selection of independent variables is based on Bulter's (1982) suggestion that only those housing characteristics which are both costly to produce and yielding utility to residents should be included.

Physical attributes, locational attributes, amenities provided, and services and occupancy restrictions are the four sets of factors under analysis. There are totally 18 independent variables selected to study their effect on serviced apartment rents. Most of the features are included in hedonic studies of residential units and thought to be sensitive to serviced apartment rents. The independent variables included in each set of factors are described below.

4.2.2.1. Physical Attributes

The age, internal floor area, floor level, number of bedrooms and en suite bedrooms of serviced apartments, and the presence of balcony are the set of physical attributes included in the model. They can be classified into continuous variables and dummy variables.

Continuous Variables

Age (AGE)

As buildings deteriorate with time, the age of the serviced apartment is the proxy of the physical conditions of it. AGE is measured as the difference in number of years between the date of transaction and the date of obtaining occupation permit. Ages of serviced apartments are expected to have an inverse relationship with rents like the behaviour of other kinds of properties.

Internal Floor Area (IFA), *Number of Bedrooms* (BED) and *Number of En suite Bedrooms* (ENSUITE)

Both internal floor area and number of bedrooms in a serviced apartment unit should have a positive impact on rents since tenants are willing to pay more for more space. Internal floor areas are measured in square feet.

There are also many serviced apartment units in Hong Kong having en suite bedrooms, which can increase the utility value for serviced apartment units. *Causeway Corner* in Causeway Bay, *Convention Plaza Apartments* in Wan Chai, and *Eaton House* in Blue Pool Road are three of the examples. The effect of the number of en suite bedrooms on serviced apartment rents will be compared with that of the number of bedrooms on serviced apartment rents to see if there is distinct difference between the two in tenants' eyes.

Floor Level (FLOOR)

In high-rise building, flats occupying on higher levels are generally found more expensive than lower ones, since people can enjoy better view at higher levels and escape

from the noise pollution. The variable FLOOR is measured as the floor level to which the transacted serviced apartment unit is situated.

Dummy Variable

Balcony (BAL)

Due to the high density of serviced apartment projects, open space may be a valuable attribute. For this reason the variable BAL is included in the model to determine how the market values its presence. Examples of serviced apartment units having balconies include *Broadwood Apartments* in Happy Valley, *Central 88* in Central, and *Lily Court Tower 2* in Mid-Levels. The variable BAL assigned as 1 if a balcony is present.

4.2.2.2. Locational Attributes

Continuous Variable

Distance to the nearest MTR station (MTR)

Regarding accessibility, it is to a large extent influenced by the available means of transportation. As the locations of most of the Hong Kong serviced apartments are situated in places well served by different modes of transportation, only MTR is included in this study to examine its impact on serviced apartment rents. This is because, on one hand, MTR is regarded as the most convenient public transport and, on the other hand, the distance to the nearest MTR stations to a serviced apartment may possibly greater than that to the nearest bus and mini-bus stations, since buses and mini-buses operate more number of routes than that of MTR to serve different location needs. As a result, serviced apartments with close proximity to a MTR station are especially valued by tenants. The variable MTR incorporated in the model is measured as the direct distance of the nearest MTR station to a particular serviced apartment project on the map in metres.

Dummy Variables

Central & Admiralty (CA), *Causeway Bay & Wan Chai* (CWBWC), *Tsimshatsui* (TST), and Sheung Wan (SW)

As mentioned in Literature Review, accessibility to employment, recreation, schools, etc. should theoretically be significant in hedonic price studies. Nevertheless, due to the complexity of accessibility-related factors inherent in a particular location, independent variables measuring the locational attributes are often difficult to test successfully in empirical studies. In view of this, the location variables are established as four dummy variables to represents serviced apartment units situated in different districts in order to examine the location(s) that are favoured by serviced apartment tenants. Since the four

dummy variables are grouped in the way such that each proxies different distinct locational characteristics, the empirical results are able to show those characteristics that are valued by tenants.

The dummy variables include Central and Admiralty (CA), Causeway Bay and Wan Chai (CWBWC), Tsimshatsui (TST), and Sheung Wan (SW), with Happy Valley and Mid-levels as the omitted variable. If the serviced apartment unit is situated in Central, then CA is equal to 1, and all other locational dummies are equal to 0. If the unit is situated in Mid-levels, all these locational dummies are equal to 0.

The following explains what locational characteristics that each locational dummy represent.

Central & Admiralty (CA)

Central & Admiralty are the central business districts in Hong Kong, with many well-known and distinctive offices and high-class shopping malls established. International Finance Centre and Landmark in Central, and Pacific Place in Admiralty are examples of well-known office and shopping mall complexes in the two districts. The two places have a close proximity to employment and entertainment such that people can go to work and play conveniently if living in there. Nevertheless, the noise and air pollutions are very serious. *Ice House Serviced Apartment and Ovolo* are two of the serviced apartments located in Central. There are only two serviced apartments situated in Admiralty: *Parkside* and *The Atrium*. Both of which are owned by Swire Properties.

Causeway Bay & Wanchai (CWBWC) and Tsimshatsui (TST)

Causeway Bay and Wanchai are situated in Hong Kong Island, whereas Tsimshatsui is on Kowloon side. Three of them are secondary business districts, with many popular shopping malls situated in there. Similar to Central and Admiralty, serviced apartment tenants may prefer living in these areas due to its proximity to work and entertainment. The noise and air pollutions are also serious in these districts. [22] *Shama Causeway Bay*, *The Wesley* and *New World Apartments* are serviced apartments situated in the three districts respectively.

[22] The EPD provides updates on Air Pollution Index (API) and prepares annual reports on air pollution levels in fourteen fixed monitoring stations. However, there are only two of the monitoring stations, namely the Central and Causeway Bay roadside station, fall into the author's defined areas. Comparing the API Monthly Summaries in the period of 2002 to 2004, the two locations exhibit similar level of air pollution.

Sheung Wan (SW)

Sheung Wan is also a secondary business district. However, it is different from the above mentioned districts as Sheung Wan has no popular entertainment places. *338 Apartment* and *Manhattan Heights* are two of the well-known serviced apartments there.

Omitted Variables – Happy Valley and Midlevels

Finally, Happy Valley and Mid-levels are neither business district nor entertaining places. Instead, they are concentrated with luxury apartments and famous for the high quality of the living environment: fresh air, quiet, nice neighbours, etc. As the tenants of serviced apartments are the high income group who desire a high standard of living, these "non-monetary considerations" are important for them when choosing where to reside. Nevertheless, travel time and costs incurred to economic and social facilities are greater than the above mentioned districts. *Ming's Court* and *The Ellipsis*, *Peach Blossom* and *2 MacDonnell Road* are popular serviced apartments in Happy Valley and Mid-levels respectively.

To conclude, when selecting serviced apartment locations, tenants have to trade-off between accessibility to business districts and quality of the living environment. The results generated in the hedonic model can thus examine the preference of tenants regarding locations of serviced apartments, which can serve as a suggestion for investors regarding site selection for future serviced apartments.

4.2.2.3. Amenities Provided

All of the three variables representing various amenities provided in serviced apartments are dummy variables. They are explained one by one below.

Sea view (SEA)

A sea view provides a spacious and relaxing feeling that most people prefer. There are many serviced apartment units situated along the Harbour front: *Gateway Apartments* and *Convention Plaza Apartments* for instance. If the unit has a sea view, the variable SEA is assigned as 1 and 0 otherwise.

Parking (PARKING)

The provision of parking facilities should enhance the rental value of serviced apartments because this enhances the convenience of car owner tenants. The variables

PARKING takes on the value of 1 if car parking facilities are provided in the serviced apartment.

Miscellaneous amenities (MISC)

Previous hedonic studies of conventional residential apartments showed that the multicollinearity problem among common area amenity variables is serious. This is because variables such as swimming pools, tennis courts and saunas, etc., are usually part of a club house of a conventional apartment. This makes the signs of the coefficients of these variables sometimes not as expected and/or insignificant in regression analyses. As a result, it may not be possible to determine which features are important. In order to tackle the problem, certain kinds of amenities are combined to form a single independent variable MISC, as explain below.

MISC is a facility dummy variable which equals one if there are more than five types of defined facilities in the serviced apartment.[23] These defined facilities include:

1. swimming pool
2. billiards
3. golf driving net or video golf stimulator
4. gymnasium
5. Jacuzzi
6. sauna
7. steam bath
8. solarium
9. tennis court
10. squash court

The 10 types of amenities are chosen owing to two reasons. First, the author finds that they are the most common types of amenities, if any, found it serviced apartments. Second, they are costly to provide, operate and maintain, and believe to be valued by residents. MISC is expected to have a substantial positive impact on serviced apartment rents.

[23] The author has adopted several specifications to deal with the multicollinearity problem and found that the variable MISC is the most efficient means to tackle the problem. Please refer to Appendix 1for the correlation matrix of the amenities variables.

4.2.2.4. Services and Occupancy Restrictions

Free in-room broadband internet access (NET) and *Number of maid service(s) per week* (MAID)

One distinct difference between serviced apartments and conventional residential projects is the services offered. For instance, all of the serviced apartments provide maid services and broadband internet access. Some also offer shuttle bus and limousine services upon request. These services are expected to increase the utility of tenants and thus contribute to rents to a certain extent. The author only considers the effect of provisions of maid services and broadband internet access in this study, since they are found to be the two "must have" items for serviced apartments in Hong Kong. Although all serviced apartments offer these two items, it is discovered that not all serviced apartments count the usage of these two services into the rental package.

NET is the dummy variable to measure the impact of provision of free in-room broadband internet access on rents. It is assigned as 1 if free access is provided and 0 otherwise. MAID is the continuous variable to represent the frequency of free maid services provided a week. It equals 1 if the free maid service is provided once a week, and 7 if it is provided seven times a week.

Lease term (TERM) and *utilities paid* (UTILITIES)

Same as conventional rental apartments, serviced apartment operators are expected to maximize revenues through minimizing vacancy rates and turnover costs which include new tenant search costs such as advertising expenses, cleaning, and lost revenues due to the apartment unit being unoccupied as suggested by Sirmans et al. (1994). When market competition for tenants is keen, some sort of rental concessions may be required to achieve desired occupancy rates. As a result, there is a common practice that the longer the period of stay of tenants in a serviced apartment, the greater the amount of concessions offered by the operator. This is true for some of the serviced apartments in Hong Kong, which usually offered a discount of 3% to tenants staying three months or above, and 5% for staying more than five months. The variable TERM should thus have a significant effect on rent.

Concerning this, the variable TERM is included in the model to see how the length of stay affect serviced apartment rents. It is measured as the number of months of occupying a unit.

Although rental packages are always offered by serviced apartments in Hong Kong, some of the packages do not include utilities charges. Instead, tenants need to pay the charges separately every month based on meter readings. The rental charges for those units need not pay utilities charges separately are expected to be higher. The dummy variable UTILITIES is used to verify the statement, which equals 1 if utilities charge is included in the rental package.

4.2.3. Expected Signs of Variables

The details of each independent variable have been explained in the previous section. Their expected signs in the regression analysis are summarized in Table 7.

Independent Variable	**Expected Sign**
Structural Attributes	
Age (AGE)	-ve
Internal floor area (IFA)	+ve
Floor level (FLOOR)	+ve
Number of bedrooms (BED)	+ve
Number of en suite bedrooms (ENSUITE)	+ve
Balcony (BAL)	+ve
Locatioanl Attributes	
Distance to the nearest MTR station (MTR)	-ve
Central or Admiralty (CA)	Uncertain but expected to be greater than that of CWBWC, TST and SW
Causeway Bay or Wan Chai (CWBWC)	Uncertain but expected to be smaller than CA
Tsimshatsui (TST)	Uncertain but expected to be smaller than CA
Sheung Wan (SW)	Uncertain but expected to be smaller than CA, CWBWC and TST
Amenities Provided	
Sea view (SEA)	+ve
Parking (PARKING)	+ve
Miscellaneous amenities (MISC)	+ve
Services and Occupancy Restrictions	
Free in-room broadband internet access (NET)	+ve
Number of maid service(s) per week (MAID)	+ve
Lease term (TERM)	-ve
Utilities paid (UTILITIES)	+ve

Table 7: Expected Signs of Independent Variables

All of the expected signs of independent variables are stated except the four locational dummy variables. Empirical test has to be carried out in order to figure out the

location preference of serviced apartment tenants. Regarding this, the author would like to make three points here:

1. One expectation that can be made is that serviced apartments situated in the CBD, i.e. Central and Admiralty, should be more popular than that in other secondary business districts, holding all other factors constant. This is because the CBD is a place providing more job opportunities compared with other secondary business districts. Having mentioned that travel time and costs related to work is the major concern of tenants, the rents of apartments situated in Central and Admiralty should be higher than that in other business districts since competition for living in the two places to minimize transportation cost is high.

2. Serviced apartments situated in Sheung Wan are expected to have lower rental level than situated in other business districts, holding all other factors constant. This is because, on one hand, Sheung Wan does not provide as many job opportunities as Central and Admiralty, the CBDs in Hong Kong. On the other hand, compared with other business districts, Sheung Wan possess no popular entertaining and recreational places.

3. Having mentioned in Literature Review, tenants have to trade-off between accessibility to work and entertainment, and the quality of living environment. Hence, tenants would give up living in a business district if the benefits of living out of it exceed that of living inside a business district. The author is going to find out the preference of serviced apartment tenants empirically.

4.3. Data

This section presents the details of the data used in the empirical analysis. The definition of serviced apartment rents adopted in this study, selection of properties, sources of data, as well as period of investigation will be explained one by one. There are altogether 633 observations from 27 serviced apartment projects throughout Hong Kong form which all information required in this study can be obtained.

4.3.1. Definition of Serviced Apartment Rent

In the serviced apartment market, it should be noted that rent is expressed as a "package" – the total cost of occupying a unit. Management fees, government rates, utilities

charges and all other expenses and services provided have already been included in the 'package', regardless of whether the tenants need those services or not. However, more and more serviced apartment operators exclude utilities charges from the rental package. Instead, they install meters in every unit to order to calculate the utilities payment, which offers the tenants' energy saving incentive. Nowadays there are about 35% of serviced apartment projects in Hong Kong adopting this approach.

Transacted rents of serviced apartment units are used in this empirical analysis rather than asking rents despite the fact that asking rents are much easier obtainable than transacted rents. Some previous studies concerning the residential market claim that asking rents are presumed to mirror the property owners' expectations of the future market rent level. However, this is untenable in the context of property. Asking rents are usually considered to be overpriced and the extent varies from landlord to landlord, and from time to time.

At a particular point of time, the higher the landlord's motivation to increase the occupancy rate, the higher is the extent of concessions the landlord offers to tenant (Sirmans et al., 1994). Across the time horizon, the serviced apartment market also experiences boom and slump. The greater the demand, the lower is the extent of rental price negotiation. As a result, the transacted rents are logically the best to indicate the market value of different units.

4.3.2. Selection of Properties

Since the author is trying to figure out the rent determinants of serviced apartments in Hong Kong, all serviced apartments are the author's target of study, provided that they fit with the definition of serviced apartments adopted, as explained in Section 1.4. This ensures the model will be applicable to all serviced apartments in Hong Kong, and the results can be served as a general reference for operators, feasibility analysts, and even tenants.

4.3.3. Sources of Data

Transaction data employed in this dissertation were obtained from Jones Lang LaSalle, Hong Kong. In addition to the information included in the database, information on the housing attributes that may affect serviced apartments rents were also obtained from the following sources:

- Landscope Real Estate Services Limited;
- Centamap;
- web sites of serviced apartments; and
- phone contacts with serviced apartment management offices.

To ensure data obtained from Jones Lang LaSalle is correct, the above mentioned sources also serve as the paths for the author to double check the data obtained.

4.3.4. Period of Observation

In order to collect sufficient amount of transaction records, transactions took place in between April 2002 and November 2004 are included in the analysis.

In view of the outbreak of Severe Acute Respiratory Syndrome (SARS) during the first half of 2003, transactions taken place in between the first and second quarter 2003 are discarded[24]. This is because the tourism industry and the real estate market collapsed during this period which might vary the rental trend movement of serviced apartments. Although there has no information concerning the occupancy of serviced apartments, the average hotel occupancy fell to as low as 18% during this period.[25] Excluding transactions in between this period from the empirical analysis is to avoid this inconsistency which may affect the accuracy of the results.

To summarize, there were altogether 633 observations from 27 serviced apartment projects throughout Hong Kong form which all information required in this study can be obtained. Descriptive statistics for the variables used are illustrated in Table 8.

[24] Hong Kong delisted as a SARS-affected area on 23 June. The Hong Kong Tourism Board immediately implemented a Global Tourism Revival Campaign and resulted in a great success. According to Hong Kong Year Book 2003, although inbound tourism suffered a drastic downturn in the second quarter of 2003 upon the impact of SARS, strength regained swiftly in the third quarter and advanced further in the fourth quarter.

[25] Hong Kong Tourism Board (2003), *A Statistical Review of HK Tourism*. Hong Kong, Hong Kong Tourism Board.

Variable	Mean	Std. Dev.	Min.	Max.
Dependent Variable				
ln(RENT)	10.21	0.57	9.14	13.43
Independent Variables				
Structural Attributes				
AGE	6.80	5.74	0	22
IFA	805.17	453.29	270	2931
FLOOR	17.35	11.53	1	49
BED	1.06	0.90	0	4
ENSUITE	0.38	0.51	0	2
BAL	0.05	0.22	0	1
Locational Attributes				
MTR	738.38	736.45	44	2525
CA	0.13	0.33	0	1
CWBWC	0.38	0.49	0	1
TST	0.12	0.33	0	1
SW	0.08	0.27	0	1
Amenities Provided				
SEA	0.23	0.42	0	1
PARKING	0.66	0.22	0	1
MISC	0.22	0.47	0	1
Services and Occupancy Restrictions				
NET	0.71	0.42	0	1
MAID	4.09	0.45	0	7
TERM	4.89	2.59	1	24
UTILITIES	0.61	0.49	0	1
Number of Observation = 633				

Table 8 Descriptive Statistics of Variables

4.4. Conclusion

This chapter has discussed the methodology used to examine the serviced apartment rent determinants, the dependent and independent variables, and the details of the data used in the empirical analysis. Next chapter will present the model adopted and results in this study.

Chapter 5: Model and Results

This chapter presents the model and interprets the empirical results. The results obtained help serviced apartment operators and tenants to evaluate whether their expectation on rent consistent with the real situation. Ordinary least square (OLS) technique is used to estimate the coefficients of all independent variables. A computer software, E-Views, is used to facilitate the calculation. A housing attribute is considered as a determinant of serviced apartment rents when:

1. the level of significant is equal to or lower than 10%; and
2. the sign of coefficient is as expected.

5.1. Model

Having mentioned the functional form and variables selected in the hedonic price model in previous chapters, the function being analyzed is as follows:

$$\ln(\text{Rent}) = \text{Rent} = f\,(\text{P, L, A, S, O})$$

where

ln(Rent) = the natural log of the deflated transacted rent of the serviced apartment unit;

P = a set of physical attributes for the unit, including
- (a) the age of the unit;
- (b) the internal floor area of the unit;
- (c) the floor level of the unit;
- (d) the number of bedrooms of the unit;
- (e) the number of en suite bedrooms of the unit; and
- (f) balcony.

L = a set of location attributes for the apartment, including
- (a) the distance to the nearest MTR station; and
- (b) four dummy variables distinguishing different districts in Hong Kong specifying the location of the apartment.

A = a set of amenities provided for the apartment, including
- (a) sea view;

(b) parking; and

(c) miscellaneous amenities (such as swimming pool, gym, tennis court, etc.).

S = a set of services and occupancy restrictions for the apartment, including

(a) free in-room broadband internet access;

(b) maid services;

(c) lease term; and

(f) utilities charge paid.

Consequently, the hedonic price model is constructed as:

$$\ln(RENT) = a_0 + a_1AGE + a_2IFA + a_3FLOOR + a_4BED + a_5ENSUITE + a_6BAL + a_7MTR + a_8CA + a_9CWBWC + a_{10}TST + a_{11}SW + a_{12}SEA + a_{13}PARKING + a_{14}MISC + a_{15}NET + a_{16}MAID + a_{17}TERM + a_{18}UTILITIES + \varepsilon$$

5.2. Empirical Results

The regression results are shown in Table 9. The correlation matrix, as presented in Appendix 2, shows that the problem of multicollinearity is acceptable, with only three pairs of independent variables exhibiting correlations greater than the absolute value of 0.70. However, since White's (1980) test shows that the problem of heteroscedasticity exists, the model is estimated using the White (1982) adjustment for estimating a heteroscedasticity consistent covariance matrix in the presence of heteroscedasticity of unknown forms.

Variable	Coefficient	t-Statistic	P-value
INTERCEPT	8.618323	100.1702	0
Physical Attributes			
AGE*	-0.02659	-7.46679	0
IFA*	0.0006	12.21121	0
FLOOR*	0.010269	9.883612	0
BED*	0.124181	7.677222	0
ENSUITE*	0.152686	3.813314	0.0002
BAL**	0.159219	2.425816	0.0156
Locational Attributes			
MTR*	0.000323	5.591732	0
CA*	0.591631	10.43618	0
CWBWC**	0.091567	1.648897	0.0997
TST	0.062743	0.656037	0.512
SW*	-1.25052	-10.7168	0
Amenities Provided			
SEA*	0.082474	3.166326	0.0016
PARKING	0.018649	0.405295	0.6854
MISC*	0.526078	7.592701	0
Services and Occupancy Restrictions			
NET*	0.412855	4.813102	0
MAID	0.008159	1.04394	0.2969
TERM	-0.0002	-0.12453	0.9009
UTILITIES*	0.298825	5.325064	0
Adjusted R^2	**0.875305**		
F-statistic	**247.4642**		
Prob(F-statistic)	**0**		
Number of observations	**633**		
Dependent variable	**ln (RENT)**		

* Significant at 1% level

** Significant at 10% level

Table 9: The Regression Results

The empirical model has good explanatory power with an adjusted R^2 of 88%. This means that the model is able to explain 88% of the variation of the dependent variable. Apart from this, most coefficients of the independent variables have the expected sign, and most are significant at the 10% level or better using a two-tailed test. The results are explained in the following section in details.

Alternative functional forms for the hedonic price equation have also been attempted so as to obtain a better model specification. For example, the effect of some continuous variables may not be linear. Consequently, the square forms of some continuous variables, i.e.

AGE, IFA, FLOOR, BED and ENSUITE, have been respectively included in the model to see if this is the case in the serviced apartment markets. The results produced are more or less the same as the log-linear model. The square terms even have insignificant effect on rent. This suggests that the log-linear specification should be reasonably good enough to be used in this study.

5.3. Interpretation of Empirical Results

Most of the p-values of independent variables in the empirical result are smaller than 0.10, implying that most of the variables are significant at the 10% level or significant at the 90% confidence level except TST, PARKING, MAID and TERM. In addition, most of the signs of the coefficients are as expected except MTR. The empirical results of every independent variable are discussed in the following paragraphs.

Physical Attributes

The physical attributes, AGE, IFA, FLOOR, BED, ENSUTIE and BAL are all found to significantly affect serviced apartment rent at 5% level. In hedonic price studies, project age is always used as a proxy for depreciation of quality of the building services, building appearance, etc. As expected, serviced apartment rent tends to be lower with increasing age owing to the functional and physical depreciation. One year old increase in the age results in 3% drop in serviced apartment rent. This indicates that old units have difficulty in competing with newer counterparts.

The variables IFA, BED and ENSUITE are positive and highly significant. This implies that tenants of serviced apartments prefer units with a larger size, more number of bedrooms, as well as more en suite bedrooms to increase their utility. One square feet increase in the internal floor area results in 0.06% increase of serviced apartment rent, whereas an additional bedroom rises rent about 12%, holding other factors constant. The results indicated that although significant, the impact of size on rent is very small. Perhaps this is partly because tenants usually determine the size of a unit by the “feel” of the unit which can be affected by its layout, the use of natural light, the colours of painted and/or wall-papered walls, etc. This is especially true for serviced apartments, where operators are design-conscious that they used their interior layout as a kind of marketing tool.

En suite bedrooms are commonly found in the Hong Kong serviced apartments market, which are preferred by serviced apartment tenants since they would be more convenient if their bedrooms include a bathroom. The variables BED and ENSUITE show

only a small degree of correlation (about 0.42) so that the t-statistics is still applicable. The result shows that 15% appreciation of rent for inclusion for one additional en suite bedroom, greater than that of an additional bedroom by 3%. This implies that serviced apartment tenants do have a preference for en suite bedrooms. This implication is especially important for feasibility analysts as the inclusion of en suite bedrooms may decrease the flexibility in their designs.

As expected, higher floor level units turn out to be more valued by serviced apartment tenants since the higher the floor level, the better the view, and the less tenants being affected by traffic noise. The increase in one floor level results in 0.1% increase of rent.

The regression coefficient for the dummy variable BAL reveals that 16% appreciation of rent can be achieved for the presence of a balcony. This substantial increase is due to the fact that most of the serviced apartment designs are of high density. Provision of a balcony is possibly valued by tenants since it allows open space to the outside.

Locational Attributes

The increase in distance (in metres) to the nearest MTR station from a serviced apartment has a positive impact on rent, although the effect is very mild to only 0.03%, which is out of the author's expectation. This may be due to the fact that serviced apartment tenants prefer an apartment which is in close proximity to their places of work. They try to avoid travelling in order to minimize their transportation cost. As a result, the proximity to a MTR station may not be a determining factor in choosing a serviced apartment.

The four locational dummy variables, CA, CWBWC, TST and SW are all found to be significantly affecting serviced apartment rents at 10% level except TST. The location preferences of serviced apartments are listed as follows, starting from the most expensive location:

1. Central and Admiralty
2. Causeway Bay and Wanchai
3. Happy Valley and Mid-Levels
   (The two locations are used as omitted variables)
4. Sheung Wan

Other factors being constant, serviced apartments located in Central and Admiralty are found to be the most expensive, worth 59% higher than that in Happy Valley and

Mid-Levels. Causeway Bay and Wanchai are the second most expensive locations of serviced apartments, possess rental 9% higher than that of Happy Valley and Mid-Levels. Serviced apartments situated in Sheung Wan exhibits 125% of rent lower than that in Happy Valley and Mid-Levels.

The empirical results confirm with the expected ones. Central and Admiralty are the most popular locations among all business districts since they provide more job opportunities compared with other secondary business districts. At the same time, Sheung Wan is found to be the least popular one since it is purely a business district having no popular entertainment or recreation places. This location is also less valued by tenants when compared with Happy Valley and Mid-Levels, the two residential districts. This reflects good living environment is more appealing to serviced apartment tenants than a secondary business district when the latter does not possess proper entertaining and recreational facilities.

Nevertheless, accessibility to work and entertainment is, to certain extent, still more appealing to serviced apartment tenants than the quality of living environment, despite the serious pollution. This is shown by the regression results that business districts, except Sheung Wan, are more valued by tenants compared with luxury residential districts, Happy Valley and Mid-Levels. The insignificance of the TST variable is perhaps due to the small variations of the data. There are only four serviced apartment projects situated in Tsimshatsui among the transaction data used in this study. Most of the transactions obtained took place in two of these four projects. As a result, serviced apartments located in Tsimshatsui possess similar housing attributes in this study which render the effect of this variable captured by other independent variables.

Amenities

The coefficients of the amenities variables SEA and MISC are positive and significant revealing, as expected, that rent increases with the presence of sea view and miscellaneous amenities such as saunas and swimming pools. The inclusion of more than five types of defined common area amenities results in 53% increase in serviced apartment rent. This substantial amount reflects that tenants are conscious about the provision of recreational facilities in serviced apartment projects. The presence of sea view also enhances the serviced apartment rental value by 8%. This confirms that tenants prefer serviced apartment units situated along the Harbour front, which provide a spacious and relaxing feeling.

The variable PARKING is not significant. This may be due to the fact that serviced apartments are a kind of short to medium term accommodation. The demand of which are

mainly foreign business executives and tourists who probably do not own a car. Consequently, the provision of parking spaces is not a determining factor on rent.

Services and Occupancy Restrictions

One area of difference between serviced apartments and conventional apartments is the range of services available. Provision of free in-room broadband internet access (NET) and free maid services (MAID) are perceived as a distinctive feature for serviced apartment units. The former increases rent by 41% whereas the latter is insignificant. The exceptionally substantial influence of NET on rent may due to the fact that the variable captures some factors that cannot be measured by the hedonic price model used in this study. Nevertheless, the reason for the insignificance of MAID may be attributed to unknown data problem. This variable should be significantly positive since the provision of free maid services is always perceived to be valued by tenants. Two other specifications of this attribute are thus attempted. The first one is to use a dummy variable which equals one if more than 3 days of free maid services are provided per week and zero otherwise. The second one is to use a dummy variable which equals one if free maid services are provided at least 1 time per week and zero otherwise. This is based on an assumption that serviced apartment tenants are indifferent to the exact number of maid services provided. Nevertheless, both of these variables are also found to be insignificant. This unknown data problem constitutes a limitation of this study and is subject to further research.

Same as conventional rental apartments, serviced apartment operators are expected to maximize rental revenues through minimizing vacancy rates and turnover costs which include new tenant search costs and lost revenues due to the apartment unit being unoccupied as suggested by Sirmans et al. (1994). When market competition for tenants is keen, some sort of rental concessions may be required to achieve desired occupancy rates. As a result, there is a common practice that the longer the period of stay of tenants in a serviced apartment, the greater the amount of concessions offered by the operator. The variable TERM should have a significant effect on rent. Nevertheless, lease terms, though negative, do not appear to have statistically significant explanatory power for rents. This may be due to the small variations in data. While most of the serviced apartments allow the minimum period of stay as short as one day, in our data, the lease terms range from 1 month to 24 months. This is because tenants staying in serviced apartments not exceeding a month usually may not approach a broker firm to deal with tenancy matters. Small variation in the lease term results where more than 50% of the transaction data obtained has one month lease term.

Finally, as expected, the results show that the inclusion of utilities charges into rental packages increases rent by 30%. This is because serviced apartment operators have to include the cost and profit of providing such an incentive into their rental packages.

5.4. Conclusion

To conclude, serviced apartment rent is higher for units with greater number of bedrooms, especially en suite bedrooms. In addition, provision of a balcony, common area amenities, free in-room broadband internet access and inclusion of utilities charges in rental packages also appreciate serviced apartment rent to a large extent. Serviced apartments situated in Central, Admiralty, Causeway Bay and Wanchai are popular among major business districts in Hong Kong. The high-end residential district, i.e. Happy Valley and Mid-Levels, also appeal to certain tenants who attach great importance to their quality of live.

The empirical results are meaningful in confirming most of the factors affecting conventional apartment values also affect serviced apartment rents. However, it is worth noting that the provision of car parking facilities is not a determining factor of serviced apartment rent since the tenants are mainly tourists or foreign businessmen having short term business assignments in Hong Kong who probably do not have cars. In addition, the reason for the insignificance of MAID may be attributed to unknown data problem. This constitutes a limitation of this study and is subject to further research.

These results are important to serviced apartment operators, tenants and interested developers regarding how the market value individual attributes of a serviced apartment unit. These parties can thus evaluate the current/future designs of their serviced apartment unit in order to produce better ones.

This chapter has presented and interpreted the empirical results, regarding the how different physical attributes, locational attributes, provision of amenities, services and occupancy restrictions of serviced apartment units determine rental value. Next chapter will come to the conclusion of this dissertation.

Chapter 6: Conclusion

This chapter is the conclusion. It revisits the findings of this dissertation, discusses the limitations of the empirical tests as well as suggestions for further studies. It hoped that the findings and suggestions in this study can be found useful and more studies concerning the local serviced apartment market can be carried out in the future.

6.1. Summary of Findings

There is a lack of studies concerning the serviced apartment market in Hong Kong. Nevertheless, research into this market is important to both the academic world, in seeing whether certain economic theories hold in this sector, and the business world, regarding how developers and tenants can maximize their benefits.

This dissertation has reviewed the serviced apartment market in Hong Kong and derived a hedonic price model which can be generally applicable to the serviced apartment sector. Given the large amount of leases expiring each year, identifying the key determinants of serviced apartment rent is particularly important. The hedonic price study is useful in assisting decision making by serviced apartment operators, tenants and feasibility analysts regarding rent setting and what and how housing attributes suit the market needs, in order to enhance profit margin and customer satisfaction.

Regarding the Hong Kong serviced apartment market, expatriates and tourists are traditionally the two main sources of demand and expected to be so in the future. However, local high-income residents are also the emerging market, who find the flexible lease terms, provision of comprehensive services and savings on expenses on furniture appealing. As to the supply side, the deletion of the category of "Serviced Apartments" from the Notes of all statutory plans by the Town Planning Board in 2000 means that developers can only incorporate serviced suites into hotel or residential projects, which would lessen developers' interest in developing serviced apartment projects in Hong Kong owing to the decrease in development flexibility and profit margin.

Concerning the characteristics of the existing serviced apartments, while they are mainly located on Hong Kong Island, the future supply is expected to be shifted to Tsuen Wan District. Studio and one-bedroom units are the most common settings. The minimum lease term is commonly one month, though more and more serviced apartments are shortening their lease terms to increase the flexibility of tenants.

As to the hedonic model developed, transactions of serviced apartments took place between April 2002 and November 2004 are adopted to analyze the effects of various physical, locational, amenity and service attributes on serviced apartment rent. Having reviewed the previous studies concerning various determinants of conventional apartment values, and identified the characteristics of serviced apartments in Hong Kong, totally 18 independent variables are identified for the empirical analysis. The results show that most of the amenities and services provided, as well as including utilities charges in the rental package do jack up serviced apartment rent to a large extent. Other physical factors, such as the number of bedrooms and the presence of balcony, and their locations also affect rent greatly.

6.2. Limitations and Suggestions for Further Study

There are at least six limitations in this study. First, the insignificance of the effect of maid services on serviced apartment rent is problematic since there is no reason serviced apartments provide a service that the tenants do not value. As a result, the contribution of maid services to rent is subject to further research.

Second, the GDP deflator adopted to deflate the nominal transacted rents in this study is a quarterly one. However, the Hong Kong property market is sensitive to economic changes that quarterly deflator may not be able to reflect the actual rental trend, especially for serviced apartment sector where the lease terms are relatively short so that their rents are able to quickly respond to the market changes. As a result, a monthly deflator, rather than a quarterly deflator or using time dummies would be more appropriate.

Third, the occupancy level should be included in the model. There is always an interrelationship between rental level and occupancy level. For serviced apartments with similar qualities, the higher the rent, the lower the occupancy level and vice versa. The author suggests although the pricing strategies of different serviced apartment operators are not the same, the profit margins among them are more or less the same. That is why the occupancy level should also be included in the model to study the interrelationship between the two. Nevertheless, the author is not able to obtain this piece of information since the transaction data used in this study was obtained from a real estate consultancy which does not have any occupancy information of serviced apartments. In addition, occupancy is treated as sensitive and confidential information to serviced apartment operators so that they do not willing to disclose the past records.

Fourth, a homogeneous data set is more desirable when employing the hedonic price model. This is because the problem of missing variables may cause bias in the estimated coefficients. Since this study is hoped to get readers insight regarding how serviced apartment rent is affected by the five sets of housing attributes, a heterogeneous data set is used. It is hoped that if more transaction data is obtainable in the future, more homogeneous samples can be used to study how the rental level is affected by specific attributes of serviced apartments.

The fifth limitation is about the effect of market segmentation. Owing to the heterogeneity of housing, it can be distinguished by a wide variety of attributes. Schnare and Struyk (1976) suggest that housing market segmentation occurs when households' demand for particular structural or neighbourhood characteristics is highly inelastic and the preference is shared by a relatively large number of households. Unfortunately, the definition, composition, and structure of sub-markets have not been given much attention in the hedonic-price literature (Chin and Chau, 2003), although it is an important empirical issue. As a result, it is suggested that future research into this market can take into account of the presence of sub-markets, since their features and thus target tenants are different in certain extent.

Finally, this study has focused on the housing attributes which affect serviced apartment rent. Apart from these “micro-rent determinants”, how the macroeconomic environment affects rent is also an important and interesting issue. Nevertheless, there is only one index focusing specifically on the serviced apartment market in Hong Kong, i.e. the Serviced Apartment Rental Index produced by CB Richard Ellis. The index starts from 1996 quarter one so that it may not suitable to study the long term trend. If there is an index showing a longer rental trend in the future, this study is recommended to be carried out again.

Appendix One
Correlation Matrix of Amenities Variables

There are totally ten amenity variables identified as potentially contributing to serviced apartment rent. These variables exhibited high correlations as shown in Table 10.

	POOL	BILLIARDS	GOLF	GYM	JACUZZI	SAUNA	STEAM	SOLARIUM	TENNIS	SQUASH
POOL	1									
BILLIARDS	0.514759	1								
GOLF	0.363799	0.648685	1							
GYM	0.822271	0.607178	0.429114	1						
JACUZZI	0.566748	0.42825	0.611303	0.701966	1					
SAUNA	0.708267	0.726788	0.513647	0.835427	0.810472	1				
STEAM	0.573847	0.452817	0.579116	0.676873	0.964254	0.810213	1			
SOLARIUM	0.538432	0.362343	0.619018	0.6351	0.904745	0.760211	0.938285	1		
TENNIS	0.63792	0.806935	0.517935	0.75245	0.678056	0.900677	0.71103	0.649341	1	
SQUASH	0.63792	0.806935	0.517935	0.75245	0.678056	0.900677	0.71103	0.649341	1	1

Table 10: Correlation Matrix of the Amenity Variables

The existence of multicollinearity makes it difficult to examine the effect of each of each amenity on rent. As a result, three specifications have been attempted in estimating the model. The author has used the total number of units in a serviced apartment project as the proxy for the amount of amenities provided, the simple sum of presence of amenities, and a dummy variable representing whether a serviced apartment possesses more than five types of these ten amenity variables, to deal with the problem of multicollinearity among amenity variables. The final one is adopted in this study since it produces the highest R square and encounters least multicollinearity among all independent variables, as reflected by their p-value.

Appendix Two
Correlation Matrix of Variables Used in the Hedonic Price Model

The correlation matrix, as presented in Table 11, shows that the problem of multicollinearity is acceptable, with only three pairs of independent variables exhibiting correlations greater than the absolute value of 0.70, as highlighted in yellow.

	AGE	IFA	FLOOR	BED	ENSUITE	BAL	MTR	CA	CWBWC	TST	SW	SEA
AGE	1											
IFA	0.08508	1										
FLOOR	-0.0501	0.545413	1									
BED	0.000417	0.726891	0.290441	1								
ENSUITE	-0.13465	0.514007	0.489575	0.422615	1							
BAL	-0.00331	-0.02212	-0.09967	0.080992	-0.11755	1						
MTR	0.185818	-0.13728	-0.17617	0.151078	0.101793	-0.06942	1					
CA	-0.09376	0.072988	0.070551	-0.18281	0.03215	0.150949	-0.23858	1				
CWBWC	0.036866	-0.14995	0.094748	-0.24202	-0.1748	-0.15123	-0.5563	-0.29823	1			
TST	-0.18299	0.506794	0.354552	0.299417	0.365138	-0.01868	-0.17846	-0.1405	-0.28963	1		
SW	-0.17801	-0.074	0.195051	0.096663	0.362023	-0.06831	0.718718	-0.11259	-0.23211	-0.10935	1	
SEA	-0.18105	0.153639	0.267316	0.085555	0.316814	-0.0743	-0.07851	-0.06025	0.176478	0.064662	0.183945	1
PARKING	0.547993	0.374315	0.192275	0.312661	0.201724	-0.27499	0.500334	-0.21762	-0.30717	0.224846	0.21305	-0.09135
MISC	0.21699	0.644672	0.53426	0.374864	0.327652	-0.12296	-0.25843	-0.20269	0.154416	0.587772	-0.15775	0.117122
NET	-0.19292	-0.57909	-0.42829	-0.36439	-0.22794	-0.21869	0.260508	0.053779	-0.03823	-0.53636	0.188774	-0.03384
MAID	0.101762	0.066476	-0.05846	0.02077	0.170893	-0.08579	0.36719	0.146628	-0.52895	0.233082	0.218353	-0.27102
TERM	0.225941	0.172122	0.314379	0.18781	0.151735	-0.0255	0.084101	-0.10713	0.16908	-0.0623	0.227992	0.106222
UTILITIES	0.462051	-0.11188	-0.07361	0.04843	-0.15498	-0.2875	0.466309	-0.24989	0.116105	-0.46024	0.237585	-0.30182
LNRENT	0.030916	0.844746	0.515696	0.648134	0.471449	-0.12252	-0.13483	0.212005	-0.20928	0.375486	-0.15782	0.090827

(Cont'd)

	PARKING	MISC	NET	MAID	TERM	UTILITIES	LNRENT					
AGE												
IFA												
FLOOR												
BED												
ENSUITE												
BAL												
MTR												
CA												
CWBWC												
TST												
SW												
SEA												
PARKING	1											
MISC	0.38353	1										
NET	-0.22377	-0.83564	1									
MAID	0.22129	-0.25026	0.275916	1								
TERM	0.266615	0.373471	-0.38657	-0.37889	1							
UTILITIES	0.487186	-0.09474	0.144938	0.148534	0.220477	1						
LNRENT	0.350871	0.509032	-0.38697	0.112921	0.082296	-0.00086	1					

Table 11: Correlation Matrix of Variables Used in the Hedonic Price Model

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